CEREAL SCIENCE today

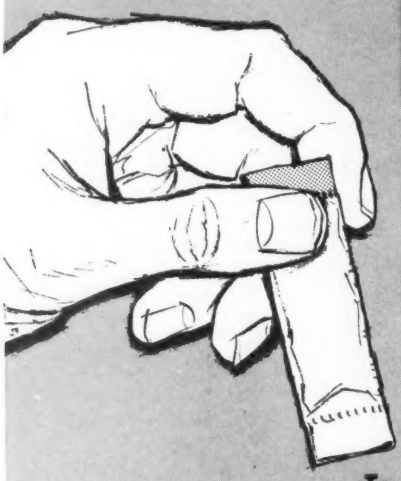
35c PER COPY

NOVEMBER 1958 VOLUME 3 • NUMBER 9

AN OFFICIAL PUBLICATION
OF THE
AMERICAN ASSOCIATION
OF CEREAL CHEMISTS

OF INTEREST THIS MONTH

MOISTURE ANALYSIS BY N.M.R.
PREGELATINIZED STARCHES
WESTERN REGIONAL RESEARCH LABORATORY



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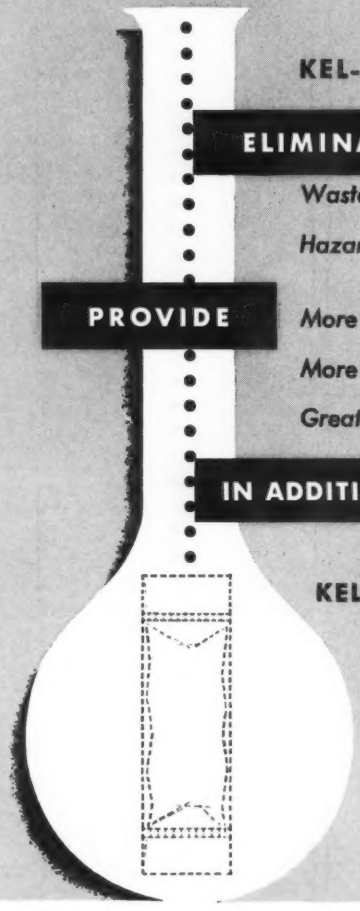

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White Flour in the U.S.A.—

Enriched* with Vitamins and Iron for Better Nutrition

by Science Writer

This article is one of a series devoted to the enrichment of family white flour, white bread and rolls, corn meal and grits, macaroni products and white rice.

The enrichment of family white flour with thiamine, riboflavin, niacin and iron by American millers is a major success. It has made great contributions to better health in the United States by improving a staple food.

Since the start of the program in 1941 by millers, voluntarily, the evidence is conclusive that enrichment not only has reduced the number of cases of certain dietary diseases but also is promoting the mental and physical vigor and well-being of the U. S. population generally. Because of its demonstrated value, the principle and practice of enrichment have been applied to other foods made from grains: corn meal and grits, white rice, macaroni, spaghetti, noodles, pastina, farina—and, of course, to white bread and rolls.

Doctors and diet experts have long supported white flour enrichment. The Council on Foods and Nutrition of the American Medical Association and the Food and Nutrition Board of the National Research Council are on record as endorsing the practice.

The legislatures of a majority of the States plus Hawaii and Puerto Rico have enacted laws which make mandatory the enrichment of all family white flour, as well as white bread, sold commercially in those areas.

American homemakers, too, favor foods they know to be enriched—a fact demonstrated by surveys. They look for these words on package labels: "Enriched with vitamins and iron for better nutrition."

What Is Enrichment?

It's an axiom in the milling industry that consumers want beautifully fine, white flour. When wheat is milled and processed to get the white flour which the public demands, vitamin and mineral values are unavoidably lost.

Enrichment restores to white flour the following important vitamin and mineral factors: thiamine, riboflavin, niacin and iron. Calcium also may be added as an optional ingredient. The process is simple and inexpensive. A mixture of the vitamins and iron is fed into the flour stream during processing. This insures that the enriching ingredients are spread evenly throughout the flour.

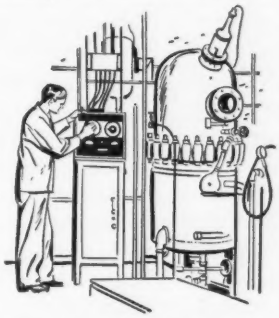
The U. S. Food and Drug Administration has established standards which white flour must meet to be properly labeled enriched. The requirements, in milligrams per pound, are:

	Min.	*Max.*
Thiamine (vitamin B_1)	2.0	2.5
Riboflavin (vitamin B_2)	1.2	1.5
Niacin (another "B" vitamin)	16.0	20.0
Iron	13.0	16.5

(In Canada, too, the same standards have been set for enriched white flour through the amendment of the Food and Drugs Act.)

Vitamins Are Made

The science of chemistry is so advanced these days that many of Nature's complex substances can be "duplicated" in the laboratory. This has happened with many vitamins. First, the chemical composition is learned. Second, the pure substance is isolated. Third, a "duplicate" is made by synthesis. And fourth, the laboratory techniques are extended to large scale operation.



The manufactured "duplicate" is identical chemically and in biological activity with Nature's own product. A vitamin is still a vitamin regardless of its source. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

The Hoffmann-La Roche people make top quality vitamins actually by the tons. To do this they use amazingly complex processes with scientific production controls and the latest equipment which fill buildings each a city block square and many stories high.

Reprints of this article, and all others in this series are available without charge. Please send your request to the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

The watermills are gone. Today's needs require today's methods. How sensible it is that millers across the nation restore health-giving vitamins and minerals through enrichment.

*Webster's Merriam Collegiate Dictionary includes this definition of "enrich": "to improve (a food) in nutritive value by addition in processing of vitamins and minerals".

BAKING NEWS FROM Pfizer

Quality Ingredients
For the Food Industry
For Over a Century

NEW INTEREST IN GLUCONO-DELTA-LACTONE AS ACIDULANT IN "INSTANT" DOUGH MIXES PERMITS BREAD PRODUCTION IN 50 MINUTES INSTEAD OF 5 HOURS.

Currently, the baking industry is evaluating new chemical leavening systems which contain glucono-delta-lactone. Following the presentation of reports at a meeting of the Association of American Cereal Chemists and Institute of Food Technologists by scientists from the Quartermaster Food and Container Institutes, many companies are evaluating new markets for products containing glucono-delta-lactone.

The reports deal with an "instant" bread mix containing glucono-delta-lactone as the acidulant. With this mix no conventional yeast fermentation and proofing steps are needed . . . chemical leavening permits production of finished bread in 50 minutes as compared to approximately 5 hours for a yeast-leavened loaf. The bread has standard shape, color, grain and texture. Moreover, this bread does not have the objectionable aftertaste found with some leavening salts.

In addition to its use in bread mix, glucono-delta-lactone has proven effective as the acidulant in prepared cake mixes, angel cake, pound cake, biscuits and roll mixes. In laboratory evaluations, Pfizer Technical Service found that the slow hydrolysis rate of glucono-delta-lactone in cold water coupled with an increased hydrolysis rate at elevated temperatures make it an excellent acidulant for baked products which can utilize a chemical raising action.

Fumaric Acid & Cream of Tartar

Other interesting Pfizer acidulants for use in chemical leavening systems are fumaric acid and cream of tartar. Both of these products have limited solubility in cold water which inhibits the reaction with bicarbonates with a resulting small evolution of gas during initial stages of mixing. An increase of solubility at elevated temperatures results in major carbon dioxide evolution at baking temperatures.

New Pfizer Sorbistat®-K

Sorbistat-K overcomes the problem of water solubility of sorbic acid. Up to 40% solutions can now be prepared rapidly by simply dissolving in water. Because of this improved solubility many companies have found in recent experience that the new potassium salt has proved more effective than the acid.

Both Sorbistat (sorbic acid, Pfizer) and its water-soluble potassium salt, Sorbistat-K (potassium sorbate, Pfizer) are effective growth inhibitors for many yeasts and molds which cause spoilage of baked goods.

Generally, Sorbistat and Sorbistat-K are effective at pH 2.0-7.0. In the baking industry, Sorbistat-K is the product of choice in chemically-leavened baked products due to its wide range of effectiveness at comparatively low levels.

Extensive laboratory evaluations have shown Sorbistat-K to be usually effective at approximately one fourth the level of propionate and at about one third the level of benzoate. In addition, at practical use levels Sorbistat-K does not impart any off-flavor to the food product.

Specifically, Sorbistat-K has proven effective in chocolate cake, pound cake, yellow cake, white cake, cheese cake, angel food cake, fruit cake and marble cake. It is also of value in many pies, filled sweet goods and cookies. The exact level of use will vary with the type of food, degree of protection needed and the amount of contamination present.

Sorbistat-K, because of its excellent water-soluble properties, can be added directly to batters in the dry form or as a water solution of potassium sorbate. If you would like further information on glucono-delta-lactone, fumaric acid, cream of tartar or Sorbistat-K, write **CHAS. PFIZER & CO., INC., Chemical Sales Division, 630 Flushing Avenue, Brooklyn 6, New York. Branch Offices: Clifton, N. J.; Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Texas.**

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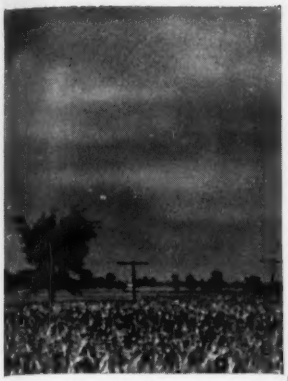

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COVER: In a chemical laboratory at the Quaker Oats Company's John Stuart Research Laboratories in Barrington, Illinois.

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CEREAL SCIENCE Today is published ten times per year (monthly except June and August) by the American Association of Cereal Chemists, from 500 South 5th Street, Minneapolis 15, Minnesota. Editorial Headquarters and Circulation Department: University Farm, St. Paul 1, Minn. Advertising Office: 360 N. Michigan Ave., Chicago 1, Ill. Entered as second class matter at the post office at Minneapolis, Minn., under the Act of August 24, 1912.

The American Association of Cereal Chemists assumes no responsibility for the statements and opinions advanced by contributors to its publications. Views expressed in the editorials are those of the editors and do not necessarily represent the official position of the American Association of Cereal Chemists.

Subscription rates: 1 year, $3.00; 2 years, $5.00; 3 years, $7.00. Foreign postage: $1.00 per year extra. Back issues available on request. Single copies: 35 cents.

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C.W. Brabender

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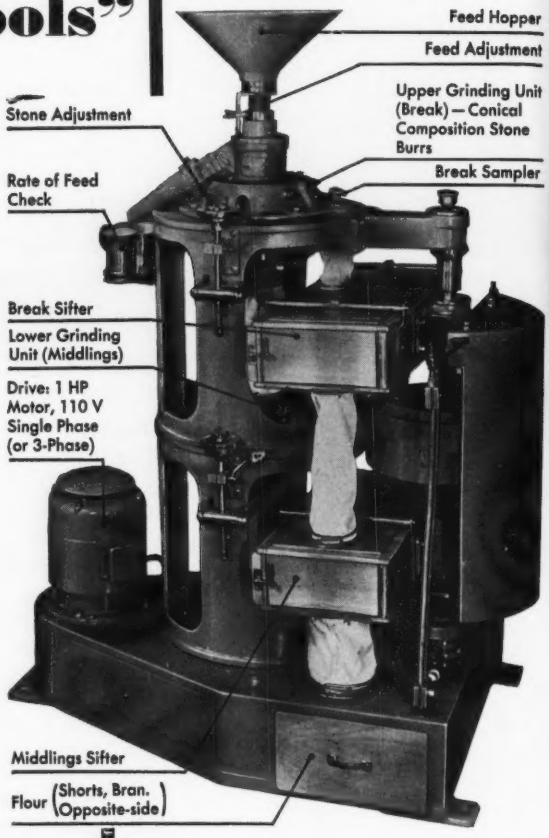
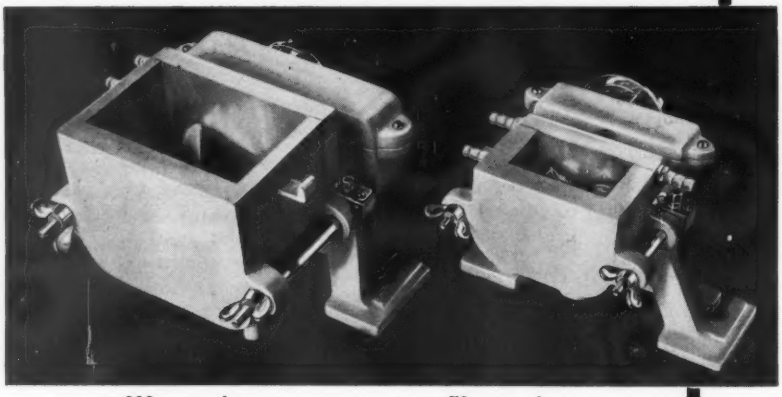
for immediate delivery

Produces flour samples fast enough to keep two Farinographs with 50-gram mixing bowls working continuously. Based on recommendations by users in cereal laboratories throughout the world, C. W. Brabender Rapid Test Mills are . . .

- **Fully automatic**
- **Mills as much as one kilogram of wheat in approximately ten minutes.**
- **Mill as little as a 100-gram sample.**
- **Easy to operate . . . even by unskilled persons.**

Results are reproducible. All adjustments are clearly marked and calibrated for easy resetting of millstones. And, **the farinograph difference between these test mill flours and commercially milled flour is no greater than the average difference between two commercial mills grinding the same wheat!**





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Editorial

OVER 3,200 COPIES of this issue of CEREAL SCIENCE TODAY will go into the mail. In addition to the 1,200 members of the American Association of Cereal Chemists who receive this publication, it is also read by more than 2,000 others interested in the technology of products processed from cereal grains. Only 225 of this latter group subscribe to our sister publication, CEREAL CHEMISTRY.

Because we think many who do not regularly see CEREAL CHEMISTRY may want to know something about what appears in this research journal and where various kinds of cereal research are being conducted, we have published on page 251 a brief synopsis of each paper that will appear in the November issue of CEREAL CHEMISTRY. Perhaps those of our readers who are not already acquainted with CEREAL CHEMISTRY will be interested in knowing that it is the leading cereal research journal in the world, is published bimonthly, and is in its 35th year. It publishes only reports of original research by authors working in government, university, and industrial laboratories throughout the world. International interest in it is indicated by the fact that 40–45% of its 2,200-plus subscribers live outside the United States.

Since CEREAL SCIENCE TODAY has the earlier mailing date, AACC members and others who receive both publications will see here a preview of what will appear in an issue that will not reach them for another four weeks. Whether we continue to publish an advance look at coming numbers of CEREAL CHEMISTRY will depend upon what our readers think of the idea.

P. E. R.

PURPOSES AND PROGRAMS OF

Glutamate Manufacturers' Technical Committee

THE GLUTAMATE INDUSTRY in the United States is comprised of four companies who produce l-glutamic acid: The Great Western Sugar Company, Hercules Powder Company, International Minerals and Chemical Company, and A. E. Staley Manufacturing Company.

Although an appreciable amount of this amino acid enters into pharmaceuticals, the bulk of the entire output is converted into the monosodium salt which, in highly purified crystalline form, is marketed and utilized as a food-seasoning agent having unique flavor-enhancing properties.

The Cereal Chemist's Angle

The cereal chemist is interested in the glutamate industry because both wheat and corn gluten are used currently in commercial production of glutamate. Sugar-beet by-product is also used as a commercial source of glutamate. Preference for any one of these materials is governed by the factors of availability and cost. In the United States, for the time being at least, prevailing cost factors have placed cereal products at an economic disadvantage as compared with the beet-molasses source, with the result that the latter now accounts for roughly two-thirds of the approximately 17 million pounds of domestic annual production. In the Orient and in Canada, on the other hand, conditions favor the use of wheat gluten almost exclusively as a raw material.

Establishment and Membership

The Glutamate Manufacturers' Technical Committee was established and is maintained by the glutamate industry in the United States to cope with those industry-wide problems of a technical or related nature which need the co-operative efforts of the whole industry for a solution. These

L. H. Burt

L. G. Buettner

areas of interest include broad research programs aimed at widening the use of the products; investigating in more detail inconclusive results of other programs; preparing technical data for government officials concerned with regulatory questions; and assembling technical data for industry publications.

The membership of the GMTC is limited to research and technical service personnel of the domestic producers of monosodium glutamate. Each member company can designate one senior and one junior member of the GMTC. The Committee has been guided and helped by a full-time consultant, M. J. Blish, who is a recognized authority on glutamate as well as proteins and amino acids. The actual organization of the Committee is comprised of the chairman, who currently is L. H. Burt, Hercules Powder Company; vice chairman, M. J. Thomas, A. E. Staley Manufacturing Company; and the secretary-treasurer, who is L. G. Buettner, International Minerals and Chemical Company.

How the Committee Operates

No permanent headquarters are maintained by the GMTC, but mail is addressed to the chairman. The GMTC neither operates laboratories nor owns scientific apparatus, but vigorously supports research programs designed to broaden the use of the products or develop needed information. With rare exceptions, this research work is undertaken in laboratories other than those of the member companies. Currently, the GMTC is supporting programs in private industrial laboratories, state agricultural experiment stations, and regional laboratories of the U.S. Department of Agriculture.

The GMTC does not normally supply general technical service, because the member companies are well organized to supply such services, but is called upon to assemble information from the member companies for government officials regarding regulatory matters. The GMTC has also collected and prepared technical data which are used by the industry and the member companies in technical and semitechnical literature.

Suggestions Are Welcome

In summary the Glutamate Manufacturers' Technical Committee is primarily concerned with broad technical problems of the glutamate industry, and would welcome suggestions for research in areas which might have been overlooked.

RESEARCH ON CEREALS AT THE

Western Regional Research Laboratory

By J. W. Pence and G. O. Kohler, Western Regional Research Laboratory,* Albany, California

IN 1938 CONGRESS PROVIDED for establishment of four regional laboratories to search for new and wider outlets for farm commodities. The laboratories are administered by the Agricultural Research Service whose central offices are in Washington, D. C. This agency is one of those comprising the functional group known as Federal-States Relations in the U. S. Department of Agriculture. The respective regional laboratories serve as headquarters for the Utilization Research and Development Divisions. The Western Laboratory is located in Albany, California, on the eastern shore of San Francisco Bay, and serves the eleven Western states—California, Oregon, Washington, Idaho, Nevada, New Mexico, Colorado, Utah, Wyoming, and Montana, and the Territories of Hawaii and Alaska. Smaller laboratories belonging to the Division are located in Pasadena, California; Prosser, Washington; and Puyallup, Washington. The other three Divisions and their respective headquarters locations are the Northern in Peoria, Illinois; the Southern in New Orleans, Louisiana; and the Eastern in Philadelphia, Pennsylvania.

Commodities Are Assigned

Each of the Utilization Divisions engages in research on commodities assigned largely on the basis of regional importance. In many instances, however, an agricultural commodity may be of such widespread economic importance that research is done on it by more than one of the Divisions. This is true in the case of cereals. Those assigned to the Western Division are wheat, Western rice, and barley. Problems concerning food uses of all types of U.S. wheat are studied at the Western Division. Industrial utilization of wheat, barley, and other cereals is of principal concern to the Northern Division. Similarly, rices grown in the Southern Region—principally long-grain types—are studied at the Southern Division; Western, or short-grain, rice is assigned to the Western Division. All three Divisions do fundamental work on their commodities, whether or not the eventual application will be for food or industrial uses, or for short-grain or long-grain rice. Regular exchange of research information, frequent conferences among personnel from the three Divisions concerned, and overall coordination of programs in Washington, D. C., assure 1) as complete coverage as possible in research on utilization of cereals and 2) avoidance of undesirable duplication of effort among the laboratories.

Three Main Areas of Research Effort

The cereal research program at the Western Division includes three main areas. The first concerns the fundamental nature of and interactions among the proteins, lipids, and carbohydrates of wheat, particularly, but

* Western Utilization Research and Development Division, Agricultural Research Service, U. S. Department of Agriculture.

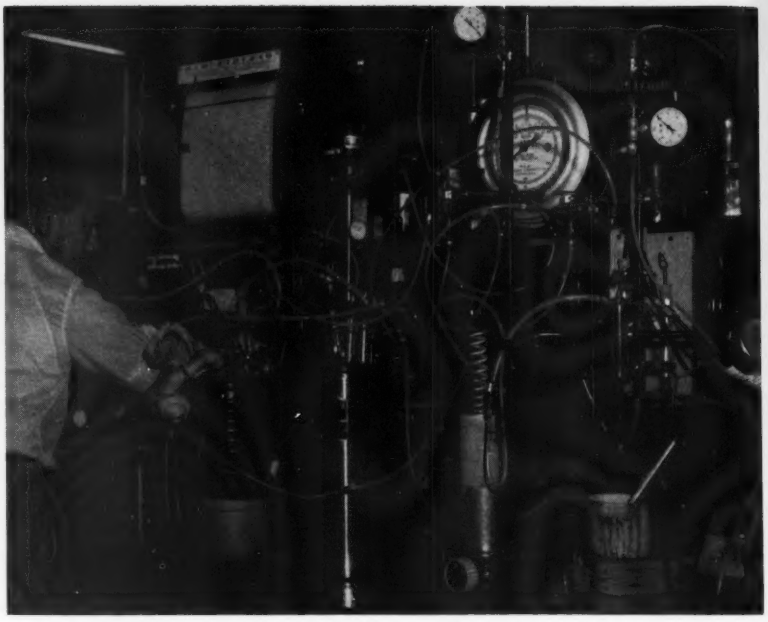
The main building of the Western Regional Research Laboratory has three stories and a basement, built in the form of a U, with administrative activities in the base and research work in the two wings. Each floor contains over 40,000 square feet. There are about 150 laboratory rooms, special conference rooms, and a library. In one wing there is a large room, extending the full height of the building, where engineering laboratory operations, in some cases on a pilot-plant scale, are conducted.

also rice and barley, to provide a base for a strong applied research program on increased use of cereals and cereal products in food, feeds, and industrial products. The second main area is applied research directed toward increasing the use of wheat and rice in their primary, high-price market—foods. The third main area relates to the upgrading of wheat, its mill by-products, and barley as animal feeds so as to increase their utilization in this massive market.

Fundamental Research Supports Other Types

The most important phase of the work on wheat is of a relatively fundamental nature. The accompanying diagram shows how basic information on the constituents of wheat, its products, and its by-products support the applied research on food, feed, and industrial uses.

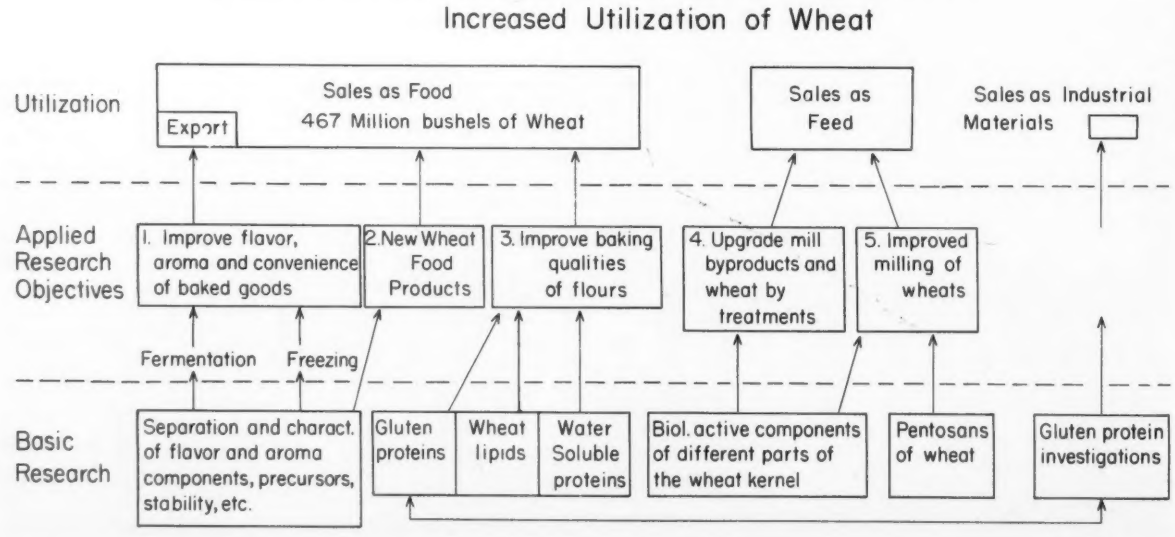
The basic studies are directed in large part toward protein components of flour and on their interactions with each other and with wheat lipids. For example, one phase of this work relates to separation and investigation of albumin proteins. These water-soluble proteins have an important influence on the behavior of gluten in bread doughs and appear to be related to the bread-baking quality of flour. A second phase concerns the insoluble proteins. Methods are needed for efficient, inexpensive separations of cleaner, more nearly homogeneous gliadin and glutenin fractions of gluten for characterization studies and for commercial exploitation in foods and industrial products. This work is very important, because the insoluble proteins of wheat govern the unique physical properties necessary in the baking industry. Further, the unique character of these proteins needs to be capitalized on to the utmost for specific end uses, if wheat is to compete with corn and other cereals as an industrial raw material.



Gas-liquid chromatographic equipment used for separation, collection, and quantitative estimations of volatile flavoring substances from bread and amino acids from hydrolysates or extracts.

Another aspect of the fundamental work concerns the role played by sulfhydryl groups of wheat proteins in dough formation and behavior during baking. This very reactive group has been of much interest for many years, because it logically could account for a major part of the well-known oxidative improvement of bread doughs by way of formation of intermolecular disulfide cross-links between the polypeptide chains of gluten. Evidence is accumulating, however, to indicate that such a mechanism is inadequate to explain all the changes observed. On the other hand, recent findings at the Western laboratory clearly implicate sulfhydryl groups in, at least, the mixing characteristics of bread doughs to an important degree. An alternate mech-

Diagrammatic illustration of relationships among project objectives to promote utilization of wheat.


Increased Utilization of Wheat
Utilization
Export
Sales as Food
467 Million bushels of Wheat
Sales as Feed
Sales as Industrial Materials
Applied Research Objectives
1. Improve flavor, aroma and convenience of baked goods
2. New Wheat Food Products
3. Improve baking qualities of flours
4. Upgrade mill byproducts and wheat by treatments
5. Improved milling of wheats
Fermentation
Freezing
Basic Research
Separation and charact. of flavor and aroma components, precursors, stability, etc.
Gluten proteins
Wheat lipids
Water Soluble proteins
Biol. active components of different parts of the wheat kernel
Pentosans of wheat
Gluten protein investigations

anism has been suggested whereby three-dimensional networks in doughs can be built up by sulfhydryl-disulfide radical interchange in lieu of oxidative changes.

Another area in which knowledge of flour proteins is meager and conflicting pertains to their relations with lipid constituents. Available evidence preponderantly indicates that a fraction, at least, of the small amounts of lipid material present in wheat flours is absolutely essential for maintenance of baking quality. This has long been known with respect to bread, but has lately been extended to cookie-baking performance at the Western laboratory. Moreover, when the active fraction of flour lipids is added back to fat-free flours, normal cookie-baking properties are completely restored, but only partly so for bread. Present work is concerned with the nature of this active fraction of flour fat that is extractable with alcohols but not with solvents such as ether or chloroform. It is not known whether the lipid material exerts its effect in combination with flour proteins or with carbohydrate materials, some of which have been previously related to cookie-baking properties by other laboratories.

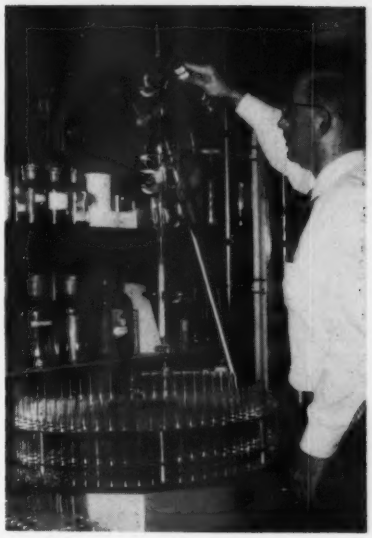
Applied Research, Principally on Foods

The major portion of applied research on wheat is directed toward food uses. Emphasis is so placed because wheat is, and will continue to be, used primarily as a food for human consumption. As such, it has a higher value than other cereal grains and results in higher financial returns to growers and processors. In the face of steadily declining per-capita consumption, research on food uses becomes an essential part of the attack on the surplus problem.

Consumption of a food crop depends mainly on four factors — taste appeal and acceptability, cost, nutritional value, and convenience of use for consumers. Wheat is processed almost exclusively by the milling and baking industries. In both, some rapid and marked changes in technology are occurring. Demand is high for information that will make such transitions easier, less expensive, and more satisfactory for quality of product to consumers and prices to wheat growers. Government research often can supply technological information which would be difficult for many individual processors to obtain.

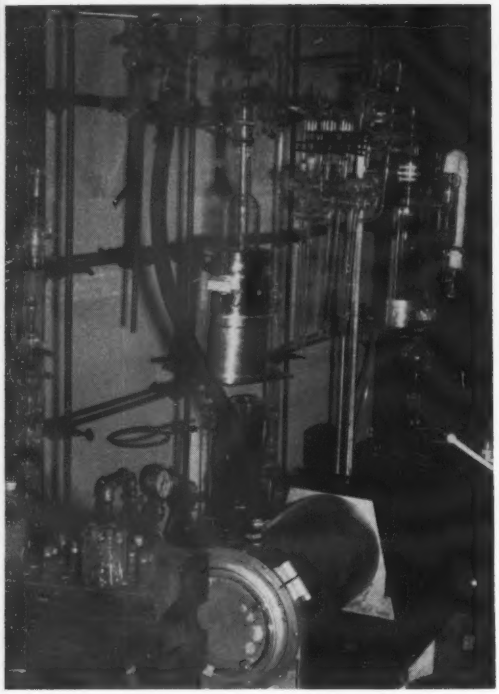
Work on the freezing of bakery products falls in this category. The interest of the baking industry in freezing stems primarily from economic pressures. It is used to level out production, reduce change-over time, eliminate stale returns, etc. The method presents an opportunity to provide fresher, tastier products to consumers that could stimulate demand if, and only if, freezing, storage, and defrosting are properly done. These considerations led to a comprehensive investigation of the effects of rates of freezing and defrosting and of storage at various temperatures on the quality of frozen products. Bread and baked cakes were given first attention because they constitute the greatest volume use of flour. Study of miscellaneous baked products—rolls, Danish pastry, fruit pies, and doughnuts—is in progress under contract at the American Institute of Baking. Work is also being started on frozen cake batters and unbaked yeast-raised goods.

"Freshly baked" flavor and aroma are essential for maximum appeal of baked products, especially bread. This flavor and aroma, however, are elusive and transient. They are unstable and quickly altered. Freezing helps to preserve freshness of flavor, but to an insufficient degree. Consequently, an intensive investigation was begun to identify and measure the volatile and extractable constituents of bread that contribute to its aroma and flavor. Two reasons are behind such a study. One is that knowledge of the chemical nature of the important constituents will promote development of methods to stabilize and enhance desirable flavor elements and to inhibit formation of undesirable, stale flavors. The second is that this type of guidance in development of pre-ferment procedures for bread production may allow more effective manipulation and control of flavor as these new types of procedures are



Chromatographic equipment for separation and quantitative estimation of plant acids in rice and wheat.

Polarographic and amperometic equipment used for estimation of disulfide and sulfhydryl group contents of flours and their fractions.



High-vacuum, manifold apparatus used for collection and rough separations of volatile flavor substances directly from bread.

adopted by the bread-baking industry. Developments in either direction would lead to improvements in the flavor of bread as it reaches consumers.

Approximately thirty compounds have so far been at least tentatively identified in samples of bread, oven volatiles, or bread extracts collected by various means. The group includes acids, alcohols, esters, carbonyl compounds, and amines. Extensive use is made of column and paper chromatography, as well as gas-liquid partition chromatography. Following identification of chemical components, it is planned to determine which aroma and flavor precursors originate from fermentation and which result from the baking step. Knowledge of the mechanisms involved will permit control and manipulation of flavor in a manner most desirable for specific products.

New Food Uses Given Attention

In addition to the common types of wheat foods available in North America, a relatively new product is being given substantial attention. The parboiled wheat product, bulgur, has been a staple in Near Eastern countries for centuries, but has been utilized in this country only on a limited scale, largely by peoples originating from countries where it is traditional. A major problem with bulgur is development of rancidity during storage. Both antioxidants and proper processing conditions were found to prolong its shelf life significantly. Development of both whole-grain and the traditional cracked products that will be quick-cooking or canned is in progress. Stable, convenient bulgurs would stimulate both domestic and foreign usage.

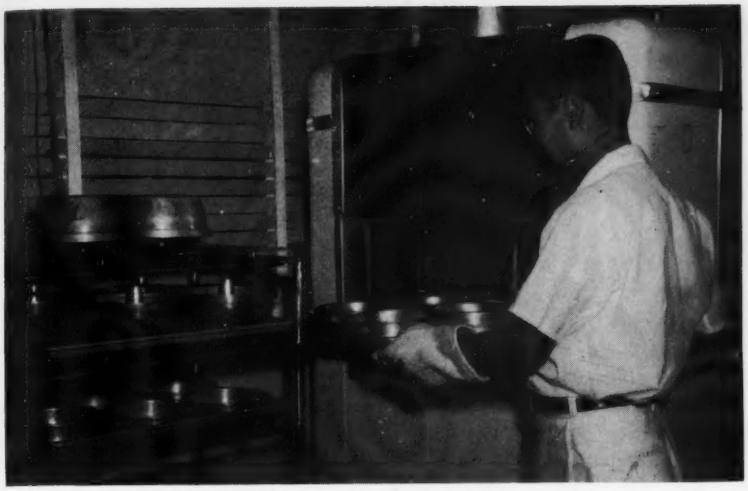
A phase of fundamental research on composition that has progressed to the applied stage concerns the relationship of acid-extractable hemicelluloses (largely pentosans from endosperm structures) of whole wheat to the milling quality of Western soft wheats. Earlier research conducted in cooperation with the Western Wheat Quality Laboratory, Pullman, Washington, and the Northern Utilization Research and Development Division demonstrated that milling quality was inversely proportional to the quantity of pentosans extractable from whole wheat. Microscopic examination showed that milling quality was related to the thickness of endosperm cell walls; these are largely hemicellulosic in composition. Milling quality is evaluated by a composite of several factors of importance in commercial milling. These are straight and patent flour yields, flour ash content, tempering moisture, and milling time. The simple chemical test for prediction of milling quality is now being evaluated on a much more broad and practical scale by application to hundreds of wheat breeding selections under a contract with Oregon State College.

By-products Used as Feeds

The principal use for wheat milling by-products is in mixed feeds for livestock. From 25 to 30% of the wheat milled into flour is used in this manner. Because these by-products represent so large a fraction of wheat milled that their acceptability and prices are reflected in the prices of wheat and flour and, thus, monetary returns to grower and processor. Improvements in the position of wheat by-products as feeds could come about through improvement of nutritional value — for example, by the presence of more protein of better quality, by improved digestibility, or by reduction in content of any constituents with adverse effects on feeding results.

With Pacific Northwest conditions especially in mind — where neither corn nor an oilseed crop to supply a protein concentrate is grown — it would be advantageous for wheat or its by-products, used as a major or main energy source in feeding, also to supply as high quality of protein as possible. As with other cereals, a limiting amino acid is lysine. If varieties of wheat having higher than usual lysine content occurred, their incorporation in a breeding program could be a most economical way of raising the protein quality of wheat or its by-products used for feed. Accordingly, over three hundred wheats

Bread-baking laboratory, equipped to handle sizes from 25-g. micro-doughs to 1-lb. loaves.



Baking cakes for studies of stability during frozen storage.

from the Department's World Wheat Collection, along with several dozen primitive wheats and related genera and of hybrids of wheat and wheat grasses, were analyzed for lysine content under a contract with the State College of Washington. Most of the samples had lysine contents that fell within a narow range, but a sufficient number were enough higher to indicate that natural variation could provide breeding stocks for varieties having substantially increased lysine contents and much greater value for feed and food purposes.

A second project on feed uses stems from the reduced feed efficiency in nonruminant animals and poultry on modern high-energy rations when wheat or wheat milling by-products are used as the energy source in place of corn or soybeans. Unidentified growth inhibitors rather than fiber content are the probable causes of this effect. Research is therefore being undertaken to eliminate them by chemical or physical means. Additional research is being supported under contract with the State College of Washington to study the improvement in feed value for poultry of wheat and Western barley resulting from water treatment of the grains or from enzyme supplementation. Preliminary evidence published earlier from this College suggests that digestibility of starch is involved.

Rice Program Parallel

Like wheat, rice is a high-value grain used primarily for food. Consequently, the research program developed for it is parallel to that for wheat. Fundamental work is directed towards the nature of and interactions among carbohydrates, proteins, and lipids. Somewhat greater emphasis, however, is placed on applied research because of differences in problems faced. Attention is concentrated on short-grain types of rice. These differ greatly in properties and in markets from the medium and long-grain rices. Short-grain rices are more cohesive when cooked and are preferred in countries such as Japan and Puerto Rico. They also are well adapted to puffed breakfast cereals.

One line of research is directed toward objective measurements of cooking and processing qualities for correlation with chemical composition. In cooperation with the California State Rice Experiment Station, Biggs, California, the stage of maturity and moisture content at harvest are likewise being correlated with cooking and processing qualities. Early results confirm the expected increase in head yields as moisture at harvest decreases; the maximum yield occurs at slightly different moisture levels in the two varieties under investigation. Additional tests are to be run on these samples from the first crop year and for one or more succeeding crop years. Other preprocessing variables to be investigated are storage conditions of rough and milled rice, drying temperatures for rough rice, and heating or other treatments subsequent to drying.

Other effort is on development of new or improved food items for convenient and quick preparation — for example, canned cooked rice. This product was well received in a market test conducted by the Agricultural Marketing Service in Fresno, California, on rice commercially packed under supervision by this laboratory. The principal criticism concerned excessive cohesiveness of the product, making it somewhat difficult to remove from the can and separate into individual kernels. Subsequent research has overcome this difficulty. Other products in final stages of development are a quick-cooking dry rice and instant, cooked breakfast cereals made from either white or brown rice. Stability of products other than milled white rice presents problems that are under investigation. Brown or undermilled rice, parboiled rice, and quick-cooking rice cereals must yet be stabilized satisfactorily against rancidity and accumulation of free fatty acids.

Processing Qualities Affected by Preprocessing Conditions

Another cooperative investigation, virtually completed, has been made with the California rice industry and the University of California to investigate heat damage in rice stored in large bins. Conditions required to prevent this condition have been well explored. Changes in distribution of free amino acids, and nonamino organic acids accompanying heat damage or that occur during storage un-

(Please turn to Page 250)

Dockage tester used with other equipment for milling quality evaluation of Western rice.

NEW TOOL FOR MOISTURE ANALYSIS

Nuclear Magnetic Resonance

By Herbert Rubin, Schlumberger Well Surveying Corporation, Ridgefield, Connecticut

MANY INDIVIDUALS RESPONSIBLE for analytical determinations of food and agricultural products are looking to one of the more recent instrumental tools for determining moisture, nuclear magnetic resonance (NMR). This technique is based upon the absorption of radiofrequency energy by hydrogen nuclei. References first appeared in the scientific literature in 1946 (2, 4), when physicists Bloch and Purcell independently performed the first successful experiments. Their work in uncovering this technique was very significant and they were subsequently awarded a joint Nobel prize. As a research tool it has provided much insight into chemical structure because of its ability to sense fairly subtle differences in bonding.

In 1950, Shaw and Elsken (6) of the U. S. Department of Agriculture made the first applications to moisture determination in hygroscopic materials. Since then, progress in this part of the field has advanced at a modest rate. One of the prime limitations has been the difficulty in fabrication of an instrument designed specifically for quantitative measurements. During the past few years the Schlumberger NMR Analyzer, shown in the photograph, has been developed with the requirements of precise, routine analysis in mind.

Some of the advantages which this mode of measurement offers are:

1) It is rapid in comparison with standard techniques; the actual measuring period is usually 30 seconds.

2) It is nondestructive. The material may be used for other tests or returned to the batch.

3) Its precision is equivalent to that of standard techniques.

4) Sample preparation is minimal and most solids may be used as-is.

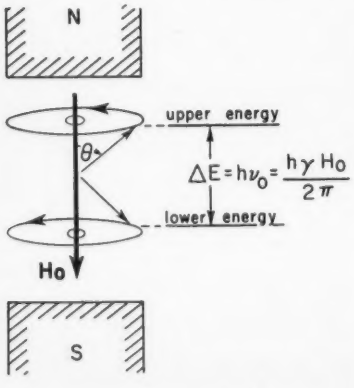
The Schlumberger Model 104 NMR moisture analyzer for water-content measurement in a wide variety of industrial solids. Left, console; right, magnet unit.

Physical Principles of NMR Absorption

The NMR technique is successful because many elements and isotopes have nuclei which possess magnetic properties. These nuclei, which are composed of charged subatomic particles, spin like a top about their own central axes. Since any moving charged body creates its own magnetic field, the nuclei behave like spinning bar magnets. When a collection of such nuclei is placed in the field of a permanent magnet, an interaction occurs and the axes of rotation of these spinning nuclei orient in fixed directions with relation to the applied field.

In the picture of an atom described by the quantum-mechanical theory, there are two possible orientations of the nuclear spin axes (for hydrogen nuclei) around the magnetic field direction. These correspond to two discrete energy levels (see diagram). Transitions between

Hydrogen nuclei in a given magnetic field can have two orientations, corresponding to two energy levels. This diagram shows the splitting of these energy levels for nuclear spin number $I = \frac{1}{2}$.



these levels are caused by the application of an oscillating magnetic field of frequency ν_0, such that the following relation for the resonance condition is satisfied:

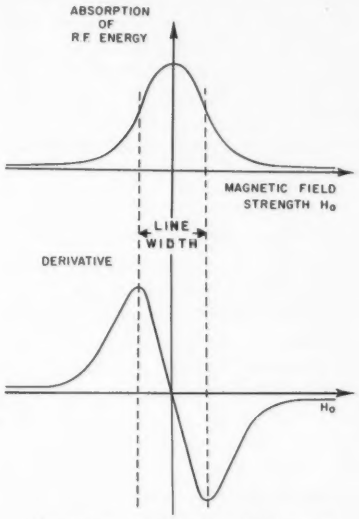
$$E = h\nu_0 = h\gamma H_0/2,$$

where: E = difference between energy levels
h = Planck's constant
γ = gyromagnetic ratio (unique for each isotope)
H_0 = field strength of magnet
ν_0 = frequency of radiation required for transition

This equation gives the energy absorbed from the oscillating field by each proton which undergoes a transition to the upper energy state. Therefore, the net energy absorbed by a collection of protons is related to the number of these nuclei. In the case of a proton, the resonance frequency, ν_0, with a 10,000-gauss magnet, is 42.6 megacycles per second. This frequency is applied to the sample by placing it in a coil supplied by a radiofrequency (RF) source.

If a fixed value of RF is used, and if the strength of the total magnetic field is increased and decreased (swept) over a small range centered about H_0, there results an absorption line — the NMR spectrum. Instrumentally it is better, for reasons concerned with noise and stability, to obtain the derivative absorption curve. This is accomplished by superimposing an audio-frequency square wave upon the magnetic field sweep and by demodulating the output of the RF amplifier in phase with the modulation voltage. Both the absorption and derivative curves are shown in a diagram. In the Model 104 NMR Analyzer, it is the derivative curve which is recorded.

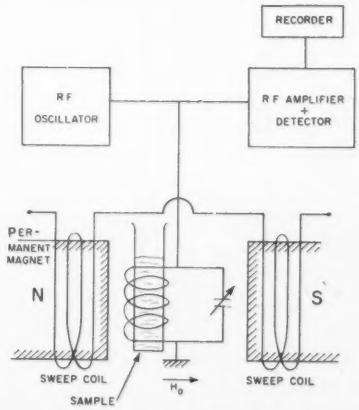
It is informative to note that there are two basic types of NMR spectrometers — one with high resolving power for narrow lines, and one with high stability for wide lines. The high-resolution type is mainly applied to fluid samples wherein the fine details of electron shielding and nuclear-spin coupling are studied. These are subtle phenomena and they are quite important in structural determinations. The wide-line instrument, of which the NMR Analyzer is an example, examines spectra in which fine-detail phenomena are absent. Such spectra are generally shown by solids and by viscous and adsorbed fluids.



Absorption and derivative NMR curves.

Description of Equipment

The two major parts of the equipment are the 1750-gauss permanent magnet, shown in a diagram, and the electronic control console. The sample container is inserted in the RF coil which is part of a resonant circuit; a plug-in chassis containing the RF amplifier and detector is located inside the magnet yoke. All the other functional units, the recorder and controls, are located in the console cabinet (see photograph). The magnetic field at the sample is swept linearly with time across the nuclear resonance values by a small current applied to the sweep coils from the sweep generator. The sweep cycle begins automatically when the start switch is thrown. Selector switches provide adjustment for RF level, sweep time, sweep width, modulation amplitude, signal gain, and filter time-constant.



Simple schematic for the measurement of NMR absorption.

Characteristics of the NMR Spectral Line

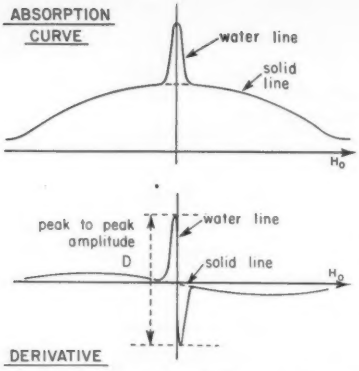
The Model 104 NMR Analyzer is tuned to proton resonance, and will therefore detect hydrogen in any state of molecular combination in the sample. Although the magnetic field strength corresponding to the center of the hydrogen resonance line always has the same value for a given RF frequency, the shape of the line is influenced by the chemical and physical state of the sample.

The width of the absorption line is strongly dependent upon the molecular motion within the sample. It is generally true that liquid compounds containing hydrogen, such as oils and water, have narrower NMR absorption lines than solid compounds. Nuclear magnetic resonance depends on the total effective magnetic field strength at the individual nucleus; the total field is the sum of the applied magnetic field at that point plus the field contributed by neighboring magnetic particles (such as magnetic nuclei).

In a solid compound of hydrogen, the nuclei are fixed rather rigidly in position with respect to their neighbors and are only capable of restricted movement. Because of this rigidity, any given nucleus may be in a total magnetic field that is several gauss lower or higher than the applied field. Since the nuclei will pass through magnetic resonance at widely different values of the applied field, the line width will be comparatively broad (of the order of several gauss).

In a liquid, the motion of the molecules is usually so rapid that the local magnetic field is smoothed out to a small average value. As a result, the NMR absorption line is very narrow, and in pure mobile liquids such as water the line width will be determined principally by the nonhomogeneity of the applied magnetic field.

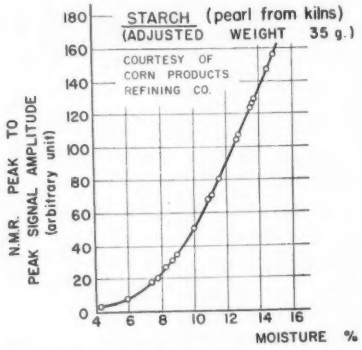
In materials where both solid and liquid are present — for example, moist starch or paper — the total NMR absorption is the sum of the absorption due to hydrogen nuclei in the solid material and in the water. We take advantage of the difference in line widths between liquids and solids to measure the moisture in hydrogen-containing substrates. A typical ab-



(Above) A typical absorption curve of a material containing both solid and liquid. (Below) In a typical derivative curve, the contribution due to the protons in the solids is negligible.

sorption curve has the appearance shown in the next diagram (above). Since the derivative of the absorption line is recorded, the contribution due to the solid is negligible in the region of the water absorption (below in same diagram). Although the width of the spectral line is quite important in that it gives an intrinsic measure of molecular motion, it is the peak-to-peak amplitude, *D*, of the derivative curve which is commonly used in moisture analysis. This is the case because an accurate measurement of *D* is easily obtained in a short time. A series of such peak-to-peak measurements is shown for moisture in corn starch.

Since the magnitude of the signal is proportional to the mass of material present (as well as water content), the results must be adjusted, either by using samples of constant mass or by dividing by sample mass to give a signal amplitude per gram. A plot of the signal versus moisture content for a graded series of starch samples is shown next. In this case constant-weight samples were used.



An actual calibration curve for moisture in starch.

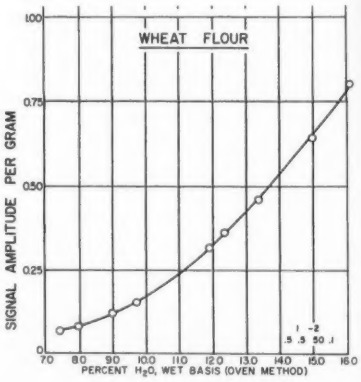
The curve obtained can be used indefinitely for moisture analysis, since instrumental fluctuations are small and show no perceptible time-dependent drift over long periods of observation. Analyses may be made using calibration curves, nomographs, or ruled scales marked directly in percent water. Total time required for most analyses is about 2 minutes. This includes sample handling, weighing, instrument operation, and obtaining the water content.

The shape of the curve in the signal versus moisture graph illustrates the nonlinear type of plot usually found. The magnitude of the slope is related to the tightness of water binding and, as may be expected, is small in low-moisture ranges. As the moisture content increases, the slope increases rapidly. In a few substances, steps, rather than smooth transitions, are observed. These indicate the occurrence of widely varying states of binding over a relatively small moisture range.

Applications of the NMR Analyzer

A promising field for the NMR technique lies in food and agriculture, because of the economic motivation for moisture determination. Restrictions based on government specifications, losses due to spoilage, and variations in handling properties are all vitally tied up with moisture content.

A number of feasibility studies on cereal products have been made as part of a food study. The results are very encouraging and are leading to wide recognition. It is difficult to estimate the lower limits of NMR sensitivity, because the signals depend upon the binding energy of water to substrate, and this varies considerably. Moisture contents of a few hundredths of 1 percent can be detected in products such as sugar, whereas highly polar materials, as gelatin, bind water so tightly that moistures in the vicinity of 10% give small signals. Calibration curves for wheat flour and types of wheat grain, and of rolled oats, converted rice, and tapioca are shown in the concluding graphs. In addition to these, moisture

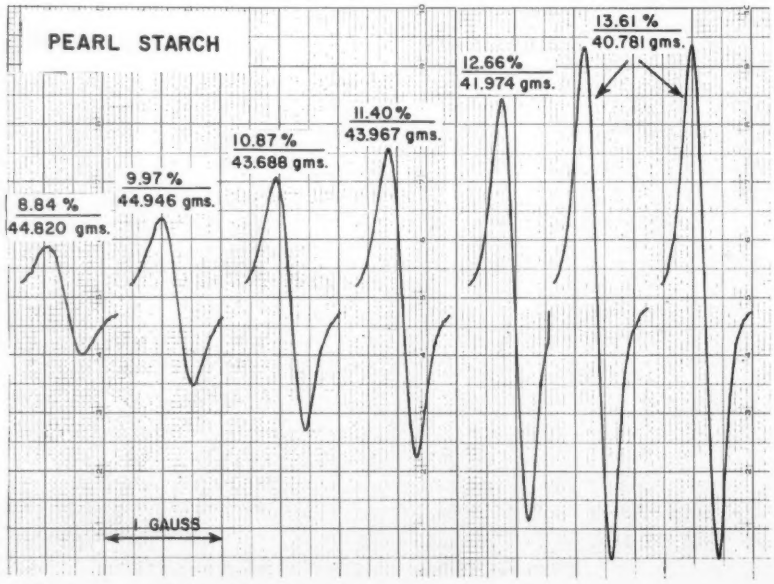


Feasibility curve for wheat flour.

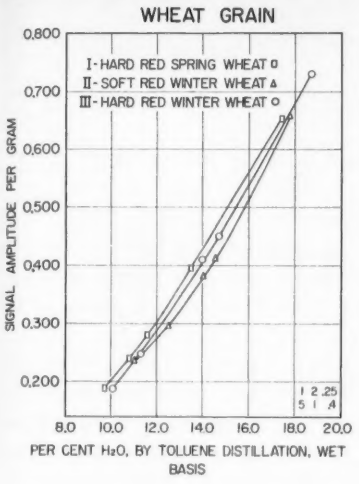
in candies (3), sugar, gelatin, pure inorganic solids, dextrins, gluten meal, starch derivatives, and whole corn (5) has been determined.

As a test of the precision obtainable in a specific case, measurements on a sealed sample of starch (containing 13.6% water) were made,

Recordings of moisture in starch. Upper figure, moisture content; lower figure, sample weight.



Feasibility curve for three types of wheat grain.


WHEAT GRAIN
I- HARD RED SPRING WHEAT
II- SOFT RED WINTER WHEAT
III- HARD RED WINTER WHEAT
SIGNAL AMPLITUDE PER GRAM
PER CENT H2O, BY TOLUENE DISTILLATION, WET BASIS

daily, over a period of several months. It was found that the 95% confidence limits for a single measurement were ±0.10% water, absolute. This corresponds to a relative error of about .0075% and compares favorably with oven analyses performed on a routine basis.

Important advantages of the NMR technique lie in its ability to make measurements which generally do not depend upon particle size, compaction, or the presence of moderate amounts of nonparamagnetic electrolytes. These variations usually interfere with other electromagnetic means of moisture analysis. This is not the case with NMR, because the nuclear characteristics being measured do not vary with the above-mentioned conditions.

Because of the wide range of instrument parameters available and the unique approach of NMR analysis, it can shed light on various phenomena. Slow, time-dependent processes which involve changes in water distribution and mobility may be studied. Among these are aging, water migration, and the effect of processing details upon water binding. At present, studies are being made on materials containing oil and water, and it appears that many products will be analyzable for both these components.

A question often asked concerns the possible use of NMR in on-stream installations. At present the instrumentation is designed strictly for batch sampling, and, where analysis of a moving stream in intervals of several minutes is acceptable, no changes are required. The use of the Analyzer on a moving stream is physically feasible. However, a particular material and process would require tailor-made sampling devices, and, as yet, no such application is known to the author. Some indications of how NMR might be used in control were recently published in an article by Aikman *et al.* (1).

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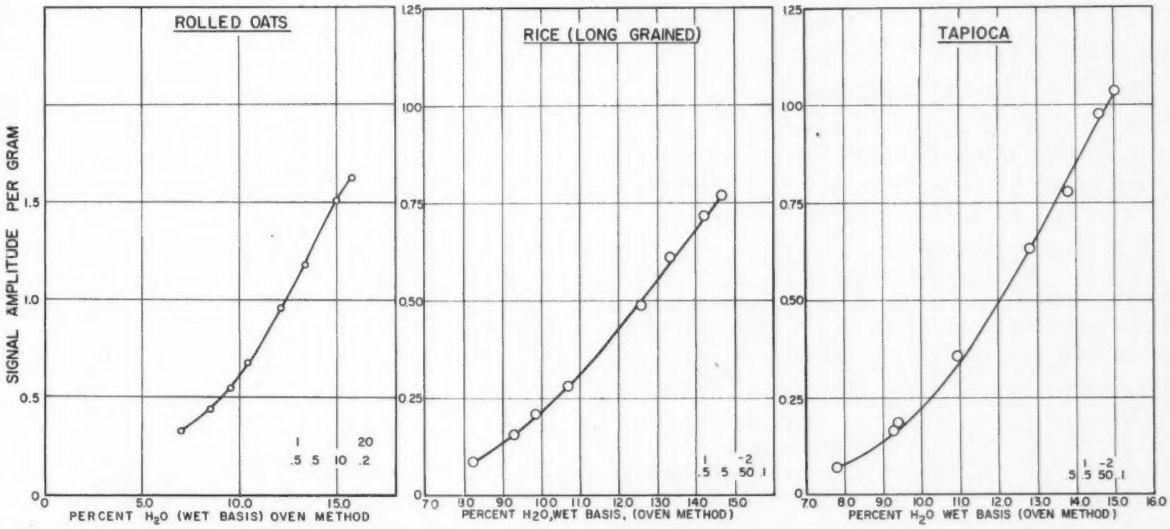

ROLLED OATS
RICE (LONG GRAINED)
TAPIOCA
SIGNAL AMPLITUDE PER GRAM
PERCENT H2O (WET BASIS) OVEN METHOD
PERCENT H2O, WET BASIS, (OVEN METHOD)
PERCENT H2O WET BASIS (OVEN METHOD)

Feasibility curves for rolled oats, converted rice, and tapioca.

CALL FOR MANUSCRIPTS! 1959 ANNUAL MEETING

At the bottom of page 259 of this issue will be found a listing of the topics to be discussed at the AACC's 44th Annual Meeting. This annual scientific conclave will be held May 3-7, 1959 at the Statler Hotel in Washington, D.C. Although tentative, the program topics listed on page 259 are the result of requests from the membership. If any member of the AACC would like to contribute a paper at the meeting he should contact the particular session chairman or the General Chairman, immediately. The Chairman is: Dr. F. E. Horan, Virginia Cellulose Research Division, Hercules Powder Co., Wilmington 99, Delaware.

PROPERTIES OF PREGELATINIZED STARCHES

LOUIS A. WOLLERMANN and EDWARD W. MAKSTELL, American Maize Products Company, Roby, Indiana

THE PRIMARY PHYSICAL role of starches in food products is that of a thickener to hold water, increase viscosity, or give "body" to the product. In view of this fact, such properties as viscosity and gelation are of primary importance in selecting starches for specific applications. As the trend in foods is toward the convenience items, with much of the preparation and processing done by the manufacturer, so the preprocessed raw materials have gained widespread acceptance among commercial food processors. Prominent among these materials are the pregelatinized starches, which do not have to be cooked and cooled by the food processor, but need only to be reconstituted with water.

The objective of this study was to investigate viscosity and gelation characteristics of certain food starches, when both in the native state and after preparation in precooked form, to gain useful data for selecting starches suitable for specific applications.

Two series of starches were studied: one, a cross-linked waxy maize group, wherein all the starch is of the amylopectin or branched chain form; and a series prepared from regular corn starch with various salts, as described in U. S. Patent 2,806,026 by Evans.

Experimental Work

For each of the pregelatinized starches prepared by cooking and drying on heated drums, the corresponding precursor starch was prepared and cooked to the maximum viscosity on the Corn Industries Viscometer, a continuous recording instrument.

Six experimental combinations were run on each starch: a water slurry at 0, 35, or 65% sucrose level, and an acid slurry (using acetic acid solution at pH 3.2) at the same three sugar levels. In all cases, the starch concentration was 8% based on weight of starch plus water.

Four observations were made on each experimental combination: 1) the viscosity at 80°F. after 10 minutes of mixing; 2) viscosity after standing overnight; 3) gel strength after standing overnight; and 4) viscosity after freezing and baking at 425°F. for 1 hour. The hot paste was cooled to 185°F. for viscosity measurement. All viscosities were checked with the Brookfield Synchroelectric Viscometer, Model RVF, and are reported in poises.

The pregelatinized starches were sifted through a 200-mesh screen and then reconstituted; the required amount of sugar for each sample was dissolved in water or acid solution at 80°F. and the starch was blended in by means of a Model 3-C Kitchen Aid mixer. After 10 minutes of stirring with this mixer at 160 r.p.m., the viscosity was checked with the Brookfield. The precursor starches were prepared as follows: the required amount of sugar was dissolved in water or acid solution; the starch was slurried in; and the mixture was cooked to maximum viscosity or for not more than 30 minutes, in the Corn Industries Viscometer.

Gel tests on all samples were made; each sample was placed in a 4-oz. refrigerator jar of the following type: A 1¾-in. stainless-steel disk is suspended in the jar on a center rod extending through the lid and ending in a hook. The disk is one inch below the surface of the sample, and is held at the correct level by a pin inserted through a hole in the rod. The force in grams required to pull the disk out of the sample is recorded as the gel strength. This is done by hooking onto one side of a double pan balance and running water into a beaker balanced on the other pan. The volume of water is then measured in a graduated cylinder.

Table I shows the various pregelatinized starches and their bulk densities. These were determined by weighing 10.000 g. of starch, placing it in a 50-cc. graduated cylinder, and tamping on the bench top until no more settling was observed. The readings of ml. per 10 g. were then converted to g. per cu. cm. and to lb. per cu. ft.

TABLE I

BULK DENSITIES OF PREGELATINIZED STARCHES

STARCH	BULK DENSITY	
	g/cu cm	*lb/cu ft*
HRN Amioca	0.465	29.0
HR W-11	0.588	36.7
HR W-12	0.541	33.7
HR W-13	0.513	32.0
721A	0.357	22.3
ARD-927	0.357	22.3
HRN 844	0.666	41.5
HRN 853	0.556	34.6
HRL	0.409	35.5
HR-PFP	0.477	29.8
HRN Fluftex	0.417	26.0

General Trends

On examination of the data obtained in this study, several general trends can be observed which are best illustrated by the graphs for each property. From Fig. 1 it is at once apparent that the cross-bonded waxy starch derivatives have much greater viscosities than those prepared from regular corn starch, whereas Amioca, the unmodified waxy starch, shows very little viscosity. Viscosity is measured from the base line of the graph to the top of the bar representing the individual sample.

The well-known depression of starch viscosity by sugar is also quite apparent, the effect of 65% sugar being to diminish the viscosity of all the starches to about the same level. In Fig. 2 the viscosity after overnight stand-

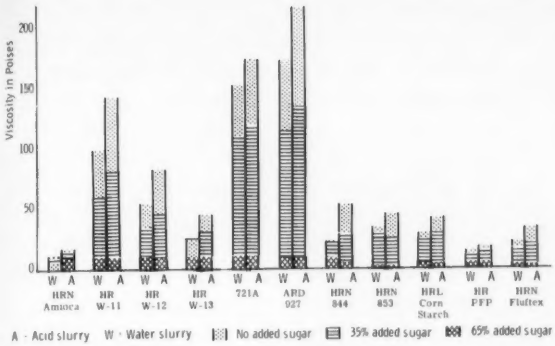


Fig. 1. Ten-minute viscosity of pregelatinized starches. (Legend: Same for Figs. 1 through 10.)

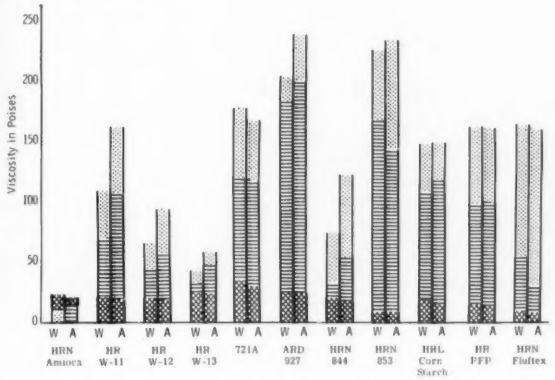


Fig. 2. Overnight viscosity of pregelatinized starches.

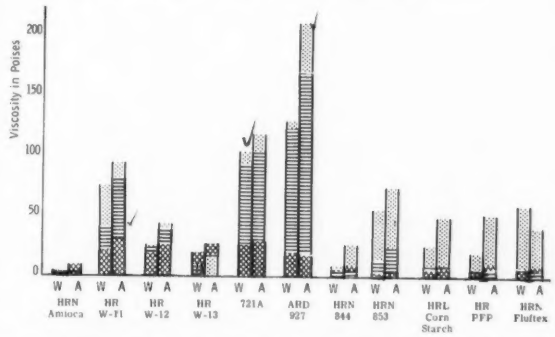


Fig. 3. Viscosity of pregelatinized starches after freezing and baking.

ing has increased only slightly for the waxy starches, but is raised markedly for the regular corn starch products. This can be attributed primarily to the fact that the regular starches form rigid gels, whereas the waxy starches do not.

Stability to freezing and baking, as shown in Fig. 3, is low with the exception of HR W-11, 721A, and ARD-927. For the latter two it is apparent that the hot viscosity remains very high in the presence of 35% sugar. This property is well utilized in preparation of pie fillings, especially those of acid nature. Tolerance to 65% sugar is also greater for these three than for the other starches.

Figure 4 points up one of the fundamental differences between waxy or branched chain starches and regular corn starch, which contains about 22% straight chain

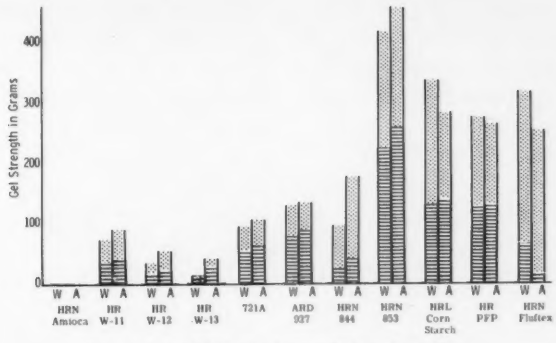


Fig. 4. Overnight gel of pregelatinized starches.

starch: the formation of rigid gels where straight chain molecules are present. The modified waxy starches did not form rigid gels but only a very heavy-bodied paste of the salad dressing type. Sugar at 65% level reduced the gel to essentially zero in all cases.

Pregelatinized Starches

In Fig. 5 are shown the bulk densities in g. per cu. cm. for pregelatinized starches. The significance of this property lies in the fact that particle size and shape seem to affect viscosity and gel strength. On first examination, only a slight correlation appears to exist in the waxy

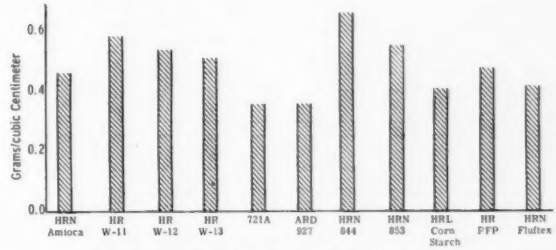


Fig. 5. Bulk densities of pregelatinized starches.

starch series and none in the regular corn starch group. However, two specific pairs might be cited for closer observation. These are ARD-927 and 721A, also HRN 844 and HRN 853.

In the first pair, the bulk density of the two are equal but ARD-927 had higher values for the viscosities and gels. This can be attributed to the use of different chemical modifications. In the second case, however, HRN 853 showed higher values for most characteristics measured, even though it and HRN 844 are identical, in so far as the raw materials used are concerned, and differ only in processing conditions.

The HRN 853 particle exists as a flat two-dimensional flake, whereas HRN 844 has a three-dimensional particle. Bulk density of HRN 853 was less than that of HRN 844, indicating that cubic particles pack more readily than flat ones in the dry state.

Two points may be offered in explanation of the differences observed between these two products. Since one may be pictured as blocks and the other as plates, it is reasonable to suggest that the platelike particles form an aggregate more resistant to the movement of a viscometer

spindle or gel breaking disk than the blocks. Also, the thin particles are probably more highly hydrated than three-dimensional particles.

Greater hydration should lead to higher viscosity. This is supported by water-absorption tests on the two starches, data for which have not been reported here.

Precursor Starches

Turning to the precursor starches, Fig. 6 shows that the same general trends apply. Waxy starches have higher viscosities and more tolerance to sugar than the regular corn starch products, and in roughly the same order as pregelatinized starches.

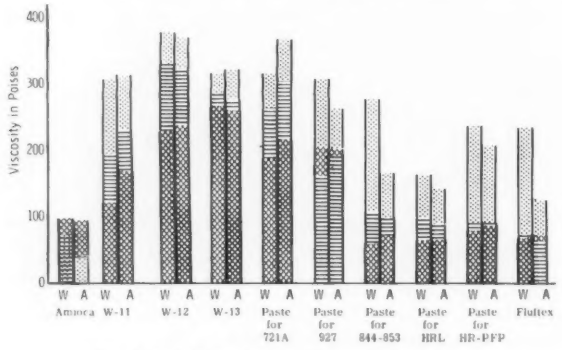


Fig. 6. Ten-minute viscosity of precursor starches.

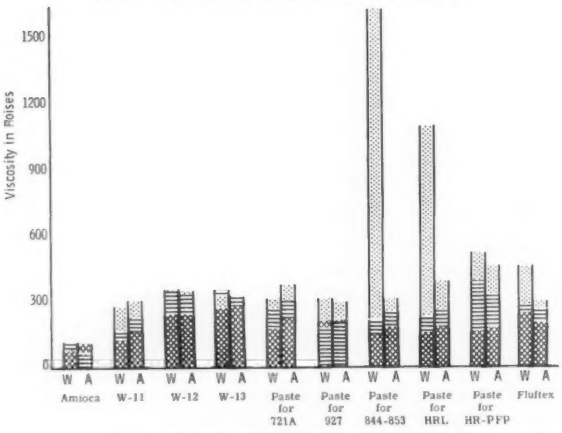


Fig. 7. Overnight viscosity of precursor starches.

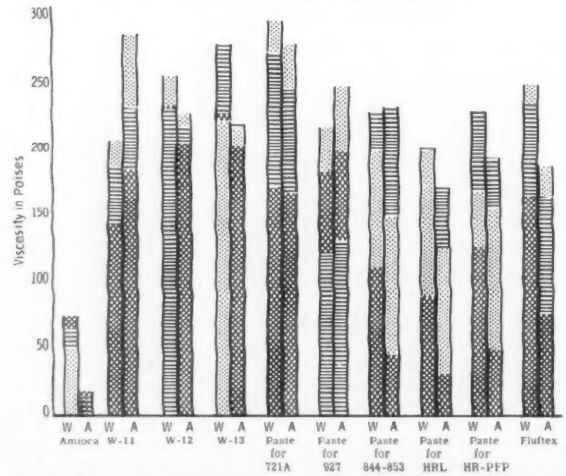


Fig. 8. Viscosity of precursor starches after freezing and baking.

Figure 7 shows the influence of the rigid gels of regular corn starches on the viscosity after overnight standing.

Figure 8 points up several considerations on the effect of freezing and subsequent baking of the starch-sugar pastes. In many of the samples the previously observed trend of viscosity decreasing with increased sugar content does not hold. For example, W-13 showed higher viscosity in the presence of 35% sugar than in the absence of sugar. The regular corn starch series also showed this same effect.

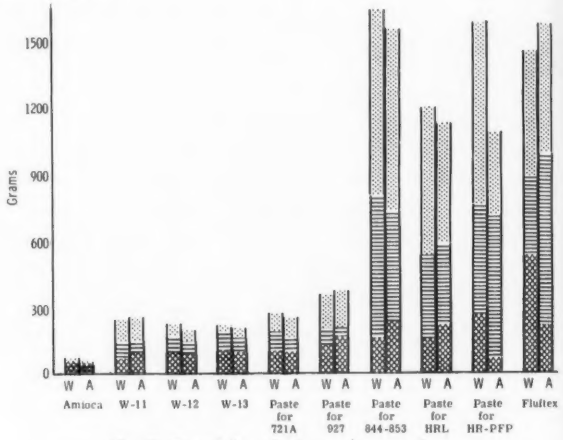


Fig. 9. Overnight gel of precursor starches.

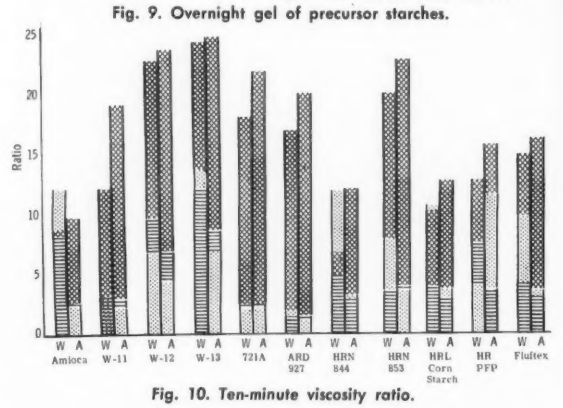
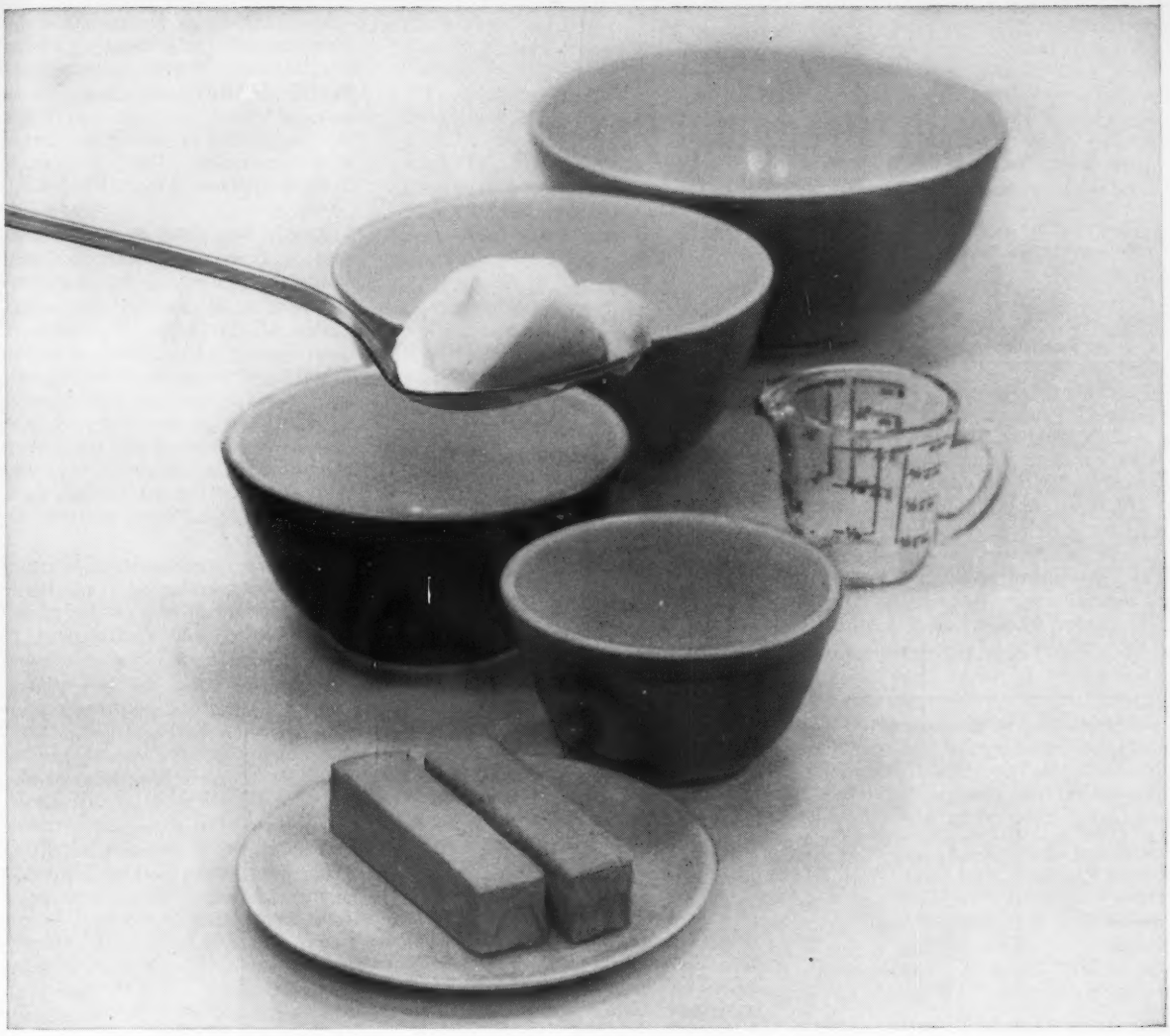


Fig. 10. Ten-minute viscosity ratio.

An interesting reversal was demonstrated in the precursor to ARD-927, in that the viscosity at 65% sugar level is in marked excess of that of the 35% level. This suggests that it might be a suitable ingredient in such products as bakers' jellies, where a sugar level in the range of 65% would be encountered.

The tremendous difference between the gels of the waxy and regular starches is amply demonstrated in Fig. 9, where the difference in magnitude is in the order of 4 to 5 times.

Finally, Fig. 10 shows the 10-minute viscosity ratio which indicates how much the viscosity of each product was diminished by the pregelatinization process. Reference to W-11 and the paste for 721A and ARD-927 indicates that these lose the least when prepared without sugar or with 35% sugar. This fact has been well applied in utilizing these starches for instant pie fillings and puddings.



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The lady on the end of the spoon? Hardly. She never heard of them. Her interest in the shortening she uses extends only to how well it helps her bake nice, light cakes with good texture—and she hasn't the slightest interest in the *Myverol Distilled Monoglycerides* that help bring it about. Same with the margarine. She likes its creamy texture, how it tastes, how well it acts for frying.

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• • • People

Charles Doughty Allen, 79, retired vice-president of H. Kohnstamm & Co., Inc., died at his summer home in Sagamore Beach, Mass., on September 7. He lived at Champlin Square, Essex, Conn.

Mr. Allen was associated with the Kohnstamm firm for more than 50 years, retiring in 1954. He was a member of the American Institute of Chemical Engineers.

Robert W. Batey appointed director of food technology at Foster D. Snell, Inc., New York; from George S. May Co.

William T. Brady becomes president and chief executive officer of Corn Products Company, formed from merger of Corn Products Refining Co. with Best Foods Inc.; **Leonard G. Blumenschine** is president, and **Aaron S. Yohalem** executive vp, of its Best Foods Division.

Boyce W. Dougherty joins Archer-Daniels industrial cereal products division, St. Joseph, Mo., as process engineer.

J. William Hannan, Chicago salesman for H. Kohnstamm & Co., Inc., was recently honored on his 50th anniversary with the company. A testimonial dinner attended by the executive staff, sales representatives, and associates in the Chicago office was given at the Conrad Hilton Hotel in Chicago. **Robert H. Pulver,** executive vp, presented Mr. Hannan with a diamond service pin and a check; associates presented him with a gold wrist watch.

Paul W. Klusmeyer appointed bacteriologist in Central Laboratories of Henningsen, Inc., Springfield, Mo.; formerly medical bacteriologist and virologist for Missouri Division of Health, and public health sanitarian.

Robert Lodge joins research department of Clinton Corn Processing, Clinton, Iowa.

Douglas L. Mann appointed assistant general manager at Western Condensing Co., division of Foremost Dairies. He will also continue as general sales manager for consumer and commodity products sold to the food, pharmaceutical, and farm industries.

Thane J. Olsby appointed technical service representative of Sterwin Chemicals, Inc., and assigned to Kansas City headquarters. He will service flour mills with Sterwin products and assist **Warren F. Keller,** manager of Flour Service Division, installing and servicing Hy-kure equipment for maturing and bleaching flour.

Wm. W. Prouty joins Langendorf United Bakeries, San Francisco.

E. O. Seabold, superintendent of chemical plant at HumKo, promoted to director of customer service in chemical department. **Louis A. Sweet,** assistant superintendent, promoted to plant superintendent.

• • • Products

Opening bread packages. A new Du Pont method for easy opening of cellophane bread packages can be used with regular end labels and minor wrapping machine modifications. A ⅜-in. strip across the top of a regular end label is not sealed to the wrapper; when grasped with the thumb and forefinger and pulled with a downward motion, the label (firmly adhered to the final cellophane fold) opens the package. Regular labels can be used, although Du Pont recommends that they be specially printed to take merchandising advantage of the added convenience. (Machine modifications necessary are explained in a Du Pont pamphlet, "New way to sell more bread." Copies available from sales representatives; or write to Film Dept., Du Pont Co., Wilmington 98, Del.)

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NMR Analyzer for moisture determination. Tests by the Model 104 Nuclear Magnetic Resonance (NMR) Analyzer are described in material study reports available for the asking from Schlumberger Well Surveying Corp., Ridgefield Instrumentation Div., Ridgefield, Conn.

Report No. 21.58 describes tests on corn, corn gluten feed and meal of various types, and actual operating results of the Analyzer installed at the Argo, Ill., plant of Corn Products Co. Speed of analysis (30 to 60 seconds per determination), new techniques for simultaneous determination of oil and water, more efficient use of personnel, and cost savings are given; also calibration curves for various corn gluten meals and feeds and ground whole corn.

No. 22.58 describes tests on dextrin and is similar to the above, giving comparisons with oven method analysis.

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Something new in hot plates. A combination hot plate and magnetic stirrer for laboratory use (developed by E. H. Sargent & Co.) produces the required heat at the plate surface but is so designed that the stainless-steel case remains cool at all times for safe handling. The plate also provides 750-watt maximum output, three heat positions, and variable stirring; it has Teflon stirring bars. Address inquiries to E. H. Sargent & Co., Dept. HP, 4647 W. Foster Ave., Chicago 30, Ill.

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Aid to visual packaging. "Western Presentation", by Western Lithograph Co. of Los Angeles, contains designs and procedures to help sell food products in breakaway and blister packages; a pilferproof package shows products through a clear film, set above the surface of attractively designed cards that are suitable either for racks, display boxes, or bins. Besides visibly displaying the product, the preprinted cards can carry company identification and a selling message, with instructions, if needed, on the reverse side. Write Food Packaging Division of Western Lithograph Co., 655 East 2nd St., Los Angeles 54, Calif.

• • •

Moisture determination in gelatin, representative of the proteins, by Model 104 NMR Analyzer is described in Material Study Report 2.58. After detailing sample preparation and steps in NMR testing, the report shows that moisture

in gelatin was measured accurately in 60 seconds by the Analyzer, as compared with 5 hours by the vacuum-oven method. A calibration curve is given. For copies of the report, write: Schlumberger Well Surveying Corporation, Ridgefield Instrumentation Division, Ridgefield, Conn.

• • •

Laboratory glassware. European producers of laboratory glassware are offering in the U.S. complete lines of volumetric, ground-joint, molded, and blown glassware. Recent purchasers have found substantial savings in spite of the high duty rate. Accordingly, Atkins Technical Inc. of Cleveland is importing and stocking scientific glassware, and offers catalogs describing 15,000 items. When fabricated from "Durus" glass the ware is fully interchangeable with, and fusable with, borosilicate glass apparatus used generally in the U.S. The announcement says that the European Standard Taper (1/10) is identical to that used here, and the variety of pieces is large (many are produced here only on a custom basis). For catalogs inquire of Atkins Technical Inc., 709 Marion Bldg., Cleveland, Ohio.

• • •

Instrument for densitometry, photometry, and colorimetry. The designers of the new Macbeth QuantaLog decided to build a series of wanted attachments around a high-quality photometer. As a result, according to the manufacturer's statement, the QuantaLog can be put to a number of photometric uses at a much lower cost than would be expected. Features are described thus: Direct reading 0 to 4.0 density units. (Meter has optical density scale printed in black and transmission and reflectance scale printed in red.) Accuracy of ±0.02 density units over the entire scale. Using low input (25 watts), it has no "heating up" problem. Full-scale sensitivity of 4.0 density with excitation of 0.01 microlumens at 2850°K. At present two attachments are in production: reflection head and transmission; a digital readout attachment to be offered soon. Macbeth Corp., P.O. Box 950, Newburgh, N.Y., will be glad to receive inquiries.

• • •

Expanded sales facilities for vital wheat gluten. Research facilities and services for the baking industry are being expanded by the Huron Milling Division of Hercules Powder Company's Virginia Cellulose Department, to keep up with increasing sales of "Vicrum," the company's new form of vital wheat gluten. The newly appointed manager of bakery services, Donald K. Dubois, will be working closely with bakery schools and with bakeries. His headquarters will be at the company's plant at Harbor Beach, Michigan, where he has been chief chemist for the past two years.

"Vicrum" is described in the announcement as vital wheat gluten, the protein component in wheat flour that gives bread its characteristic volume, grain, and texture, and supplies the over-all baking properties so essential for top-quality breads and other yeast-raised products. It is said to be the first product of its kind available, and to be produced by newly developed methods of separation and drying which yield a product consistently high in baking quality.

• • • **Patter**

Barley Improvement Conference. The biennial Barley Improvement Conference, sponsored by Malting Barley Improvement Association, will be held on Tuesday, January 20, 1959, at the Schroeder Hotel, Milwaukee, Wisconsin. The one-day program will include talks on various phases of malting barley production and research; more details will be available later.

The Association (828 N. Broadway, Milwaukee 2) will appreciate early notification by those who plan to attend the conference.

• • •

"Handling shortening and oil in tanks." A new brochure with this title has been prepared for cost-free distribution by Procter & Gamble Laboratories. Information in the brochure covers: 1) facts to be considered regarding a decision to install tanks; 2) selection and construction of storage tanks; 3) advisability and methods for nitrogen blanketing; 4) procedure for handling and unloading tank cars and tank trucks; 5) calibration of storage tanks; and 6) cleaning and maintenance of oil storage tanks. For your copy, send name and address to Procter & Gamble, Tank Oil Sales, P.O. Box 599, Cincinnati 1, Ohio.

• • •

ASBC convention plans. The American Society of Brewing Chemists will hold its Silver Anniversary Convention at the Queen Elizabeth Hotel in Montreal, May 10–14, 1959. On a recent visit in that city, President Eric Kneen assisted in setting up committees on local arrangements. He returned home confident that in their capable hands and with fine local facilities such as those offered by the beautiful new hotel with its French Canadian atmosphere, the success of this convention is well assured.

• • •

The Association of Cereal Research (Detmold, Western Germany) held its Convention for Bread and Biscuit Manufacturing in Detmold Sept. 16-18. The provisional program (the only one that has arrived so far) gives subjects and speakers as follows:

Bread production: "Bread improving with ionizing rays" — M. Blinc (Ljubljana, Jugoslavia); "New studies on microorganisms in sour-dough" — G. Spicher (Detmold); "Relations between bread quality and baking time" — Dr. Thomas and K. Fuchs (Potsdam-Rehbrucke); "Oven spring and baking process" — O. Doose (Weinheim); "Experiments with continuous sour-dough methods" — H. Stephan (Detmold); "Studies on wheat sponge dough methods" — Schulz (Detmold); "How to load multi-stage ovens" — Neumann (Koblenz); "Deviations of different quality factors in the standard baking test" — E. Drews (Detmold).

Production of rolls and flour confectionery: "Deep-freezing problems with rolls" — E. A. Gottsche (Hamburg); "The preparation of scalding masses" — Dr. Rotsch and E. Tessmer (Detmold); "Dry flour confectionery in today's nutrition" — Anita Menger (Detmold); "High-frequency and infrared baking" — Jenkes (Krefeld); "The production of whole-meal biscuits" — Dr. Rotsch and E. Tessmer (Detmold); "Quality relations between flour and rusks" —H. Dorner (Viersen) and E. Tessmer (Detmold).

Forum discussions were scheduled to follow morning and afternoon sessions.

• • •

AACC Test Baking Committee. In a session held during the 1958 annual meetings in Cincinnati, this committee discussed several questions: 1) Arcady type formula and /or yeast food. An Arcady type formula was tentatively adopted: 9.4% ammonium chloride; 0.27% potassium bromate; 30% calcium sulfate; 25% sodium chloride; 35.33% water. A yeast food level of 0.005% is recommended, with the suggestion that it be varied to secure optimum oxidation level. 2) Absorption. Regarding the "con-

stant flour" method when determining flour absorption by farinograph, there was discussion as to whether the absorption on a flour-water mixture is a true reflection of the absorption requirements of a flour during the baking process. The committee accepted Frank Wichser's offer to gather data on the relationship between the flour-water curve and the curve of a fermented dough, with particular regard to absorption. 3) Malt supplementation. Discussion was limited, dwelling particularly on the criteria by which a flour is to be considered deficient in malt supplementation. It seemed that if a flour gives an amylograph curve value of 400 to 600 BU, no malt supplement should be added.

• • •

DO-MAKER movie. A film describing the Do-Maker continuous dough-mixing process, available to all baking and allied industry trade organizations and schools, has been released by the Baker Process Co., a division of Wallace & Tiernan, Inc., Belleville, N.J. The movie is a 16-mm. sound film, in color; running time is about 12½ minutes. Filmed at the site of a typical Do-Maker installation, the movie shows exactly how the Do-Maker works and describes the bread it produces. It covers development, installation, operation, and advantages of the equipment, and shows how the Do-Maker has been instrumental in increasing bread sales and lowering operating costs. The movie can be obtained by writing to the Baker Process Co., 25 Main St., Belleville 9, N.J.

• • •

New Corn Products Company. With the merger of Corn Products Refining Co. and Best Foods, Inc., forming Corn Products Co., the entire line of Best Foods bulk materials is added to the 450 industrial bulk products already manufactured by CPR. More than 60 industries use the corn starches, syrups, dextrose, and dextrins made by CP, including baking, brewing, canning, confectionery, ice cream, pharmaceuticals, paper, textiles, printing inks, adhesives, and foundry and tanning industries. Best Foods makes coconut, cottonseed, soybean, palm kernel, and peanut oils used by processors of fried foods and in baked goods, confectionery products, margarine and shortening, mayonnaise and salad dressing, and other food products; among its industrial commodities are inedible coconut oil, crude cottonseed and soybean oils, acid oil and soap stock used in making soap, chemicals, and refined oils. The merger also brings together the consumer products made by both companies and distributed principally through the grocery trade.

CPR's 1957 annual report showed world-wide net sales of $494,891,000 and net income of $26,373,000. For the fiscal year ended June 30, 1958, Best Foods reported net sales of $118,301,000 and net earnings of $6,244,000. On the basis of these most recent annual reports, the new company would show net sales of over $613 million and net income of more than $32 million.

WURD:

(Continued from Page 239)

der controlled laboratory storage have been determined. In addition, effects of processing treatments and varietal or agronomic factors on the distribution of individual organic plant acids (nonamino, nonphytate, nonlipid) are under study in an effort to devise quick, reliable indexes of grain condition after storage or post-harvest treatments.

In conjunction with the Engineering and Development group at the Western Laboratory, a comprehensive investigation of rice drying methods was recently made. In rice drying it is essential that breakage of kernels be minimized. Hence, most commercial dryers have leaned over backwards to dry slowly and temper thoroughly between stages. Careful studies on pilot-scale equipment indicated that use of more passes, combined with higher air temperature and shorter tempering periods, could lead to substantial increases in plant capacity without loss of head yields. These findings were then confirmed in plant-scale experiments. The new system was immediately adopted by the cooperating plant operators and is spreading rapidly through the rice milling industry.

To promote more ready marketing of domestic rice in export, the Western and Southern laboratories are cooperating with several other government agencies in a comprehensive study of market rices available in foreign countries. By knowing what types and grades are available or desired in specific world markets, rices most suitable for such markets can be selected from domestic stocks for best acceptance in these markets.

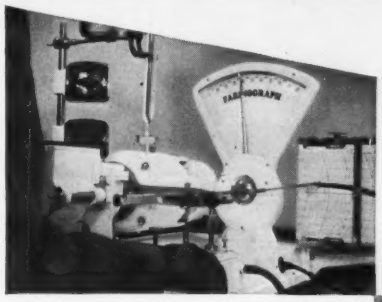
Summary

By way of summary, the cereals program at the Western Utilization Research and Development Division can be described as consisting of three main lines of effort: First, fundamental research on wheat and rice components and their interactions. This work provides basic information necessary to successful applied research on food, feed, and industrial utilization. The second line is applied research directed toward increasing the use of wheat and rice in their primary, high-price market, foods. This part of the program includes work on flavors of baked goods, pre-ferments for bread baking, freezing of baked goods, improving nonbaked wheat foods (principally bulgur) for domestic and export markets, and development of analytical methods suitable for use in breeding wheats of better milling and baking quality. The program on rice includes investigations on the chemical basis of cooking quality, development of new convenience products, and on effects of preprocessing conditions on processing and cooking qualities. Characteristics of rice most suitable for specific export markets are being determined to aid in selecting domestic rices for world trade. The third main line of effort comprises practical methods for upgrading of wheat, wheat milling by-products, and Western barley to increase their value as animal feeds.

EMPLOYMENT NOTICES

CEREAL CHEMIST

Outstanding opportunity in research division of national food company for man with industrial or research baking experience and knowledge of grains and flours. Salary open. Write P. O. Box 058, c/o CEREAL SCIENCE Today, University Farm, St. Paul 1, Minnesota.



research Notes

The Distribution of Lipase in Commercial Mill Products from Hard Red Spring Wheat – Madelyn Ferrigan and W. F. Geddes.

The amount of lipase (fat-splitting enzyme) in flour may affect baking quality and storage stability of the flour or mixes containing it. The authors report lipase activity in 32 mill streams of a hard red spring wheat mix. A germ stream had nearly 200 times the lipase activity of a second-sizings stream. Correlation between ash and lipase activity of streams was high, but not good enough to permit accurate prediction of lipase from the ash value. The research was done in the Department of Biochemistry at the University of Minnesota, in cooperation with the Quartermaster Food and Container Institute for the Armed Forces.

• • •

The Distribution of Amino Acids in Wheat and Certain Wheat Products – Millard J. Horn, Colburn C. Fifield, Amos E. Blum, and Helen W. Warren.

Amino acid assays of whole wheat, flour, bran, and shorts are reported. No destruction of amino acids was found in fermenting bread doughs. Significant losses of cystine, lysine, and methionine occurred in the crust during baking of small experimental loaves of bread. A cooperative investigation between the Human Nutrition Research Division and Field Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

• • •

Comparative Study of Wheat Flour Phosphatides – L. H. Mason and A. E. Johnston.

Lipids from two hard red winter wheat flours differing in bread-baking quality were studied. The lipid fraction from the flour of poor baking quality was found to contain a larger proportion of choline phosphatides. The paper is from the Northern Utilization Research and Development Division, U. S. Department of Agriculture.

• • •

Flour Lipids and the Bromate Reaction – C. K. Cunningham and I. Hlynka.

Despite long commercial usage and much research effort, the mechanism through which bromate exerts its improving effect upon bread dough is not completely understood. Two investigators at the Grain Research Laboratory, Board of Grain Commissioners for Canada, at Winnipeg, add to the knowledge of this subject by experiments showing how flour lipids are involved in the phenomenon.

• • •

Cooking Quality of White Rice Milled from Rough Rice Dried at Different Temperatures – Olive M. Batcher, Ruby R. Little, and Elsie H. Dawson.

Heat is commonly used to accelerate drying of rough rice. Careful comparison of samples dried at 120°, 140°, and 160°F. failed to show any improvement or deterioration in cooking quality of milled rice attributable to drying temperature. Contribution of the Human Nutrition Research Division, Agricultural Research Service, U.S. Department of Agriculture.

• • •

Continuous Batter Process for Separating Gluten from Wheat Flour – R. A. Anderson, V. F. Pfeifer, and E. B. Lancaster.

A continuous pilot plant for production of gluten and wheat starch from flour is described. Project described was carried out at the Northern Utilization Research and Development Division of the U.S. Department of Agriculture.

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Hydration Characteristics of Rice as Influenced by Variety and Drying Method – Joseph T. Hogan and Ralph W. Planck.

Milled rice samples were treated with hot water. Comparisons were made of water absorption of the grains, dissolved materials and undissolved materials in the water. Low values for all these were correlated with preferred nonsticky cooking characteristics of the long-grain varieties that have high amylose contents. Reported by workers at the Southern Utilization Research and Development Division, U.S. Department of Agriculture.

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Some Effects of the Mixing Process on the Physical Properties of Dough – C. J. Dempster and I. Hlynka.

Results based on extensogram data for doughs mixed for various times in air and in nitrogen show two effects produced during mixing. One of these is that produced by the mixing action itself. The other is a very important effect produced by the occlusion of oxygen during normal mixing. The latter has the greater influence on the structural relaxation behavior of dough. Studies were carried out at the Grain Research Laboratory, Board of Grain Commissioners for Canada.

• • •

Vital Wheat Gluten by Drum-Drying. I. Effect of Processing Variables – V. F. Pfeifer, Charles Vojnovich, and R. A. Anderson.

Vital gluten of excellent quality is obtained by drum-drying from dilute acid dispersions. Data are given on the effect of dispersion method and drying conditions upon gluten quality. Work done at Northern Utilization Research and Development Division, U.S. Department of Agriculture.

The above abstracts are from papers that will appear in the November issue of Cereal Chemistry, Vol. 35, No. 6, 1958.

SANITATION

AACC SANITATION TRAINING SCHOOLS

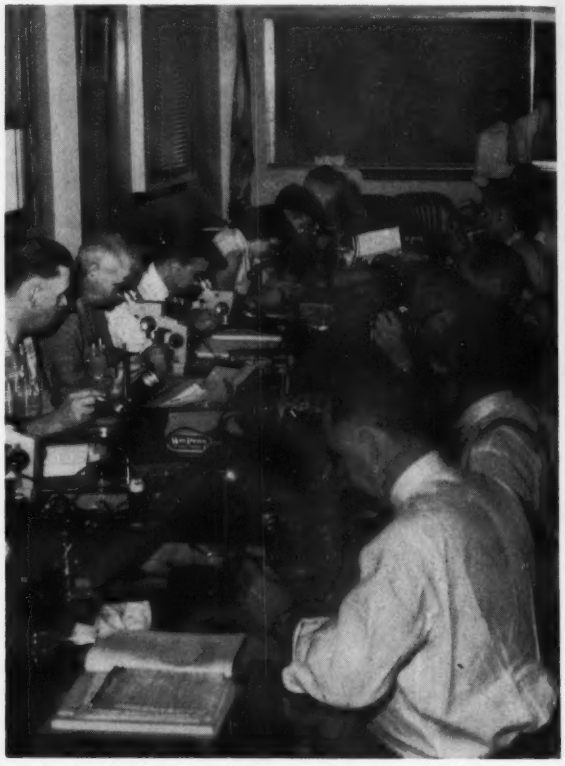
The first of the three Sanitation Training Schools sponsored by the AACC in cooperation with the U.S. Food and Drug Administration attracted 31 representatives of food-handling industries along the Pacific Coast. Instructors Kenton Harris and O'Dean Kurtz of the Food and Drug Administration conducted an intensive, week-long course in morphology and techniques for microscopic identification of insects and insect parts commonly contaminating cereal grains and products, and of rodent hairs and excreta. Fragments from insect pests of the growing plants were also discussed. The final day of the school was concerned with an optional review of X-ray techniques for detection of internal infestation.

More than half of the students came from the San Francisco Bay area, but others came from areas as far away as Santa Ana, California, and Spokane, Washington. Representatives of the milling, baking, and closely allied industries actually were outnumbered by representatives of a wide variety of canners and companies handling or producing food items.

Instructors O'Dean Kurtz and Kenton Harris of the U.S. Food and Drug Administration provided an intensive, authoritative review of information and methods pertaining to examination of cereal grains and products for insect and rodent contamination.

Local arrangements on behalf of the Northern California Section were handled under the leadership of M. C. Midgely, assisted in large part by W. S. Hale, Chairman of the Section. The training sessions were held in Albany, California, across the Bay from San Francisco, in facilities provided by the Western Regional Research Laboratory of the U.S. Department of Agriculture.

The two remaining schools of the series are scheduled for the New York City area in mid-February and in Chicago in mid-April, 1959. Personnel of the cereal industries who reside in these areas and who are interested in the latest sanitation methods are urged to be alert for announcements of the dates and registration requirements for these schools.



Students at the first AACC Sanitation Training School held at the western Regional Research Laboratory, USDA, Albany, California, represented 27 different companies, many of which were only indirectly connected with the milling and baking industries.

Part of the group at a session of the AACC Sanitation School.

ATTENTION!

New York Sanitation School
will be held
February 16-21, 1959.

• • • Canada

While most cereal chemists in the United States are familiar with many of the people and organizations active in cereal chemistry in Canada, it seems likely that a review of the status and current projects of cereal science here would be interesting and informative to members of the American Association of Cereal Chemists.

The Canadian position in the world cereal market has substantial parallel today only in Australia and Argentina. No other country has available for export such a large percentage of its food grain crop; certainly no country devotes relatively more time to maintaining its international contacts and holding its preferred position as a supplier of wheats and wheat flours of high quality.

The movement of Canadian wheat to market is controlled by the Canadian Wheat Board, an official organization set up by Act of Parliament, which has the power to control the price of wheat both internal and for export, the sale of wheat for export, and the movement of grain from farm to line elevator and into the channels of trade.

To make sure that wheat will not flood the market at times of harvest, the Wheat Board establishes quotas for delivery by the farmer to line storage. In the past several years it has sometimes been necessary for farmers to hold wheat in storage for as much as 18 months before the quota system has authorized delivery. The system has created certain problems in regard to quality of wheat deliveries but appears to have worked well in maintaining a steady flow of grain through the channels of trade.

The Canadian dependence on export markets and export trade has presented to the Canadian grain and milling industries, and to the Canadian Wheat Board, problems and challenges which exist in few other countries.

The Canadian Wheat Board's answer to these technical problems has been to establish laboratories, now under the direction of J. Ansel Anderson, a recent president of the AACC. These laboratories and the personnel involved are perhaps the most extensive of any research group in the world that is concerned primarily with problems of wheat and cereal grains. Most AACC members are familiar with the research and publications of this group and know at first hand the high level of technical qualifications maintained by its personnel.

In addition to the Canadian Wheat Board Laboratory, many other research groups in Canada, both governmental and industrial, are concerned with the problems of cereal grains — their handling, processing, and final use.

Briefly outlined below are the activities and plans of a few of these organizations. In any such review as this it is not possible to be comprehensive, and our apologies are due to many organizations carrying on basic research to which reference is not made.

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Board of Grain Commissioners Laboratories

The Board of Grain Commissioners Laboratories continues its worldwide activities in research and in the promotion of Canadian wheat and flour. Major changes in physical equipment have been made recently. The basic research laboratories have been completely rebuilt and additional equipment has been added to the facilities for applied research on wheat. A new and expanded malting laboratory is now under construction. Dr. Anderson is making a tour during the fall which will include most of Europe, and Dr. Hlynka will be visiting Japan and the Far East as a member of a Canadian mission. New members of the staff include A. H. Bloksma from The Netherlands, who holds a Postdoctorate Fellowship, and G. S. Baines from India, who is undertaking a year of research with the Grain Board Laboratories as a Colombo Plan Fellow. Recent research visitors have included the prominent German cereal chemists, P. F. Pelshenke, K. Ritter, and E. Fritsch, who spent a week in the Winnipeg laboratory and toured cereal installations in Western Canada, escorted by Norman Irvine.

Defense Research Medical Laboratories

Recent work of the Defense Research Medical Laboratories has included development studies on cereal products required by the Canadian Armed Services; including a substantial amount on prepared mixes, low-moisture baked products, and canned cereal products. Extensive work, along with field studies, has been carried on to determine the suitability of these products as to flavor, stability, and acceptability after prolonged storage.

Canada Department of Agriculture

The Cereal Crops Division of the Canada Department of Agriculture has concerned itself in general with the screening and evaluation of hybrids and new varieties of food and feed grains being developed in Canada. The Canada Department of Agriculture Research Laboratory in Winnipeg has done extensive work on malting qualities of barley, macaroni quality in durum wheat, and linseed oil quality in flax. At the Central Experimental Farm at Ottawa, hard red spring, hard red winter, soft winter, and soft spring wheats are tested, primarily as a part of the wheat-breeding programs being carried on under the department's supervision. There is close cooperation between Department of Agriculture Laboratories and the Board of Grain Commissioners in final evaluations of food and feed grains.

University and Experiment Stations: Wheat Breeding

Extensive work in breeding and hybridizing of wheat and other food and feed grains is carried on by the major universities in Canada. Substantial quantities of such work are conducted by the Universities of Alberta, Saskatchewan, and Manitoba, by Ontario Agricultural College, and by MacDonald College of McGill University. The following comments regarding Ontario Agricultural College are pertinent. O.A.C. work is largely concerned with improving varieties of soft winter wheat, winter barley, and winter rye, for the rich farming areas of southern Ontario. Efforts of the college in wheats have been concentrated on producing varieties designed to combine satisfactory milling qualities and high yield. The problem has been complicated by demands of Ontario farmers for stiff-strawed cereal varieties which would not tend to lodge under high yields and unfavorable weather conditions. Among recent varieties released by Ontario Agricultural College has been Kent, a high-protein soft winter wheat designed mostly for farmers who feed their own wheat.

Industrial Organizations

Among industrial organizations in or serving the cereal industry, extensive laboratories are maintained in Eastern Canada by the Ogilvie Flour Mills group, the Maple Leaf Milling group, and by Canada Packers Limited. Other organizations have substantial research and technical groups and, in some, research and development projects of considerable dimension are carried on. A brief description of the work of these three organizations follows.

Canada Packers Limited. Research and technical development at Canada Packers Limited is directed by Sven Young, who is well known to most members of the AACC. Research and development projects are the production of shortenings, the use of shortening in all types of baked goods, and the relation of shortenings to all other ingredients included in baked goods. A technical service program of substantial size is carried on as a service to the Canadian baking industry.

Maple Leaf Milling Co. Ltd. Main activity of the Maple Leaf research laboratories, under R. K. Larmour's direction, is in investigating new possibilities in convenience mixes and improving old formulas. The sanitation section deals with both entomological and bacteriological problems. Studies of the effectiveness of packages in preventing insect invasion pose a continuing problem, as new packaging materials and treatments come on the market. On the analytical side, new methods are studied or special ones are devised which, after proper testing, are passed along to the control laboratories at the mills. Working closely with the production side in some areas, the research labs control initial flavor mixing, and write and check specifications for packaging materials; though this is not strictly research, any changes here call for careful study of various factors. Occasionally, esoteric investigations of the properties of the matter dealt with are undertaken.

Ogilvie Flour Mills Co. Ltd. Research activities of Ogilvie Flour Mills are directed by Kenneth Gaver. While the Ogilvie program includes much work on flour, prepared mixes, and the baking process, the basic direction of Ogilvie research appears to be towards chemicals from wheat in a broad sense. Activities in this field have led to Ogilvie's becoming the major producer of wheat starch in Canada and the only domestic producer of monosodium glutamate. In addition to work done directly in the Ogilvie laboratories, considerable work is done by consultants and by projects placed with universities.

It is our hope that the above will give a good bird's-eye view of activities in Canadian research.

The writer acknowledges with thanks the cooperation of J. Ansel Anderson, Grain Research Laboratories; J. B. Hulse, Defense Research Medical Laboratories; A. G. O. Whiteside, Department of Agriculture; W. H. Waddell, Ontario Agricultural College; Sven Young, Canada Packers Limited; R. K. Larmour, Maple Leaf Milling Company; and Kenneth Gaver, Ogilvie Flour Mills Co. Ltd.

L. R. PATTON
Corresponding Editor

AACC

LOCAL SECTIONS

Toronto Section's September meeting was held at noon on the 26th. Following a buffet luncheon, members toured Brown's Bread Ltd., Toronto, and were shown the new "continuous brew" process for bread-making. Attendance was excellent and interest was high.

On October 25 a joint meeting will be held at Niagara Falls, Ontario, with the Niagara Section AOM and Buffalo Section AACC.

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Chesapeake Section opened its 1958–59 season with a dinner meeting at the Log Lodge, Beltsville. After a short business session, Morris Neustadt moderated a panel discussion on "Rapid methods for grain quality evaluation"; panelists from the USDA Research Center at Beltsville discussed the results of their work in this field.

Continuing the program, Doris Baker talked about determining the degree of deterioration in grain by fat acidity tests; R. M. Johnson spoke on measuring smut in wheat by several methods, including a new photoelectric technique; W. H. Hunt discussed the role of electrical moisture meters in grain testing, and recent developments; and A. J. Pinckney spoke on several methods of determining wheat quality – including turbidimetric, biuret, and sedimentation tests. An active question-and-answer period followed.

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Northern California Section had a turnout of about 75 people for its annual picnic on September 13, at Tilden Park, Oakland. Jim Pence presided at the barbecue, broiling steaks to order. Kenton Harris and O'Dean Kurtz of the U.S. Food and Drug administration, Washington, D.C., were guests.

New officers for 1958–59 are: chairman, Walter S. Hale; vice-chairman, Wesley M. Noble; secretary, Daniel G. McPherson; treasurer, William J. Stephens. New members welcomed to the Section are R. W. Ferrell and Harvey Sokol of the Western Utilization Research & Development Division, Albany.

A joint meeting with **Southern California Section** was held on September 24, at the Ritz Old Poodle Dog, San Francisco. This was a special meeting for members of both sections to greet AACC President Clinton L. Brooke and hear his address, "The past, present, and future of the cereal chemist." New officers were introduced, and a discussion was held regarding the selection of candidates for national offices.

The October meeting fell on the 22nd: a plant tour and dinner as guests of the C & H Sugar Co., Crockett, California.

• • •

Southern California Section's regular October meeting, on the 7th, was held at Rodger Young Auditorium, Los Angeles; Jessie Obert of the U.S. Public Health Service spoke on "Adequate diet and food-faddism."

In November the Section will be hosts to the local chapter, IFT; the date is the 12th. M. W. Flodin, Technical manager, Lysine Division, E. I. du Pont de Nemours & Co., will speak.

Cora Miller of UCLA, Section chairman, is leaving for one year on a special United Nations commission to Egypt. To fill the position thus left open, officers

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• • •

Canadian Prairie Section opened the season with a dinner meeting on Tuesday, October 21, at the Basement Cafeteria, Grain Exchange Building, Winnipeg. G. S. Baines, Senior Scientific Officer of the Divisional Food Processing Department in India, addressed the members on "Food problems and the technologist's approach in India." Mr. Baines is at present engaged in research at the Grain Research Laboratory.

• • •

New York Section held its second meeting of the 1958–59 season on October 7 at the Fifth Avenue Brass Rail Restaurant. The chairman, Otto G. Jensen, introduced his team of officers for this year, E. C. Edelmann and Wm. J. Simcox; also committee chairmen R. A. Morck, program; J. T. Buckheit, publicity; H. K. Beasley, reception; and E. Ferrari, properties.

D. A. M. Mackay of Evans Research and Development Corporation used slides to illustrate his talk on gas chromatography. He described the operation of the equipment and explained how gas chromatograms aid in identifying various components of volatile substances and flavors. The many difficulties in concentrating volatile materials from foods were discussed, particularly from the standpoint of obtaining concentrates of unaltered volatiles for chromatographic use. In addition to gas chromatograms of different fruit and vegetable flavors, Dr. Mackay showed slides illustrating differences between volatiles from regular white bread crusts and volatiles from home-style bread crusts.

The next meeting is scheduled for Monday, November 10, at the Brass Rail. Karl F. Mattil. Associate director of research for Swift & Co., will discuss edible fats and oils.

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Midwest Section met on Monday evening, October 6. As dinner guest and speaker, James W. Evans addressed the members on "Starches for the food industry." Dr. Evans, who is director of research, American Maize-Products Co., has been working with starches for the past twenty years. He discussed recently developed starches and the way they are being used in foods such as prepared baking mixes, cake frostings, prepared breakfast cereals, instant puddings, pie fillings, frozen foods, and salad dressing.

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Lone Star Section held a joint meeting September 20 with Texoma District No. 7, AOM, at Lake Texoma Lodge, Oklahoma. The following program was thoroughly enjoyed by those in attendance:

"The past, present, and future of the cereal chemist" – Clinton L. Brooke, National President, AACC: "Preventing bridging of materials in bins by use of pulsating panels" – S. S. Peltzer, Gerotor May Corporation; safety film, "Knowing is not enough"; "The use of methyl bromide as a fumigant in the cereal industry" – J. L. Maxwell, The Dow Chemical Co.; "Turbo milling" – George Schiller, Pillsbury Mills. Panel discussion, "Merits of the new wheat crop as viewed by the baker, chemist, and miller." Moderators: Wendell Reeder and Stanley Orr. Chemist panelists: Glen Findley, L. D. Longshore, and W. H. Carter. Miller panelists: E. W. Dodson, Thomas F. Thomas, and Mr. Ford.

Members expressed particular pleasure in having the National President, Clinton L. Brooke, and members of the Operative Millers' National Executive Committee, Vice-President Don Eber, and Committeemen C. W. Johnson, Thomas F. Thomas, and E. W. Dodson, appear on the program.

The next meeting will be held at Oklahoma State College in Stillwater, Oklahoma.

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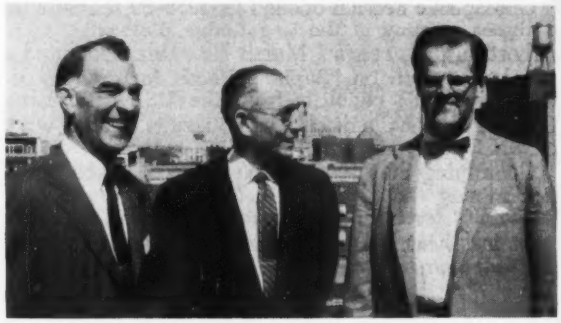
Cincinnati Section. With an estimated 100 in attendance, the combined meeting with Ohio Valley Section AOM was held at Hotel Severin, Indianapolis, on Sept. 27. The audience was augmented by members of the Technical Committee AOM who had met just previously and stayed over for the combined meeting. Papers included "Mill and bakery sanitation" by W. Butts, in charge of pest control courses, Purdue University; "The reductionizer-classifier" by C. H. Kidwell, president of Reduction Engineering Corp.; and "Bakery products from air-classified flour" by D. B. Pratt, Jr., The Pillsbury Company.



C. H. Kidwell, President Reduction Engineering; D. B. Pratt, Jr., President-Elect AACC; Donald M. Mennel, President Mennel Milling Co.

Dick Bradford, President AOM; Don Eber, Executive Vice-President AOM; Clyde J. Steele, Chairman Cincinnati Section, AACC.

The luncheon was featured by the presence of our President-Elect D. B. Pratt, Jr., who spoke briefly on association affairs. Recognition was also made of AOM officials, others active in AOM and AACC, and veteran millers and mill owners of the area.

A panel discussion, concerned chiefly with characteristics of the 1958 soft wheat crop, closed the meeting.

Combined AOM-AACC program and arrangements committees headed by W. Heald, P. Pitts, C. Arnold, and A. Bosley are to be commended for the excellent meeting and for the successful social evening, sponsored by Allied Trades, which preceded the meeting.

• • •

Pacific Northwest Section's Newsletter for September reflects an odd coincidence: Lack of cooperation from members in reporting news – while cigars

BOOK reviews

Methods of Biochemical Analysis, vol. VI, edited by David Glick; ix + 358 pp. Interscience Publishers, Inc., New York, 1958. Price $8.50. Reviewed by H. S. OLCOTT, University of California.

The high quality which characterized the previous volumes in this series is maintained in volume VI. Methods are given in sufficient detail so that the reader will not need to refer to the original literature. This reviewing has been accomplished by seasoned workers who have first-hand knowledge of the strengths and weaknesses of each. Chapter headings are: New developments in the chemical determination of nucleic acids; The microbiological assay of nucleic acids and their derivatives; Determination of formaldehyde and serine in biological systems; New methods for purification and separation of purines; Assay of serotonin and related metabolites, enzymes, and drugs; Determination of transaminase; Glycolipide determination; Methods for the determination of thiamine; Rapid electrophoresis in density gradients combined with pH and/or conductivity gradients; and Hexosamines. Unpublished information is often included. Some chapters contain descriptions of laboratory procedure; for example, in his chapter on glycolipids, Radin includes useful details for working with lipids.

The longest chapter (68 pp.) and the one probably of greatest usefulness to the cereal chemist is that on thiamine by Michelsen and Yamamoto of the National Institutes of Health. The authors discuss historical background; units of measurement; the thiamine standard; sampling problems; animal assays, including the pigeon, the chick, and the rat; microbiological assays, including yeasts, molds, and bacteria; enzymatic assays; and chemical methods. The thiochrome method is described in detail; it is now the method of choice both for routine assays and research. There are 347 references to this chapter.

Subject and author indexes and also cumulative subject and author indexes for the six volumes are included.

Summary: Well-conceived, useful, well-written, legible.

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The Handbook of Chemistry and Physics, 39th ed., Charles D. Hodgman, Robert C. Weast, and Samuel M. Selby, eds.; 3213 pp. Chemical Rubber Pub. Co., Cleveland, Ohio, 1958. Price, $12.00. Reviewed by J. ROBERT ROACH, General Mills, Inc., Minneapolis, Minnesota.

Everyone working in scientific areas must be familiar with past editions of this work. The 39th edition maintains the general features and arrangement which have been well accepted in previous editions. Recent developments in research have brought chemistry and physics into a closer relationship, so, as one might expect, much of the new material presented in this book is of a physical chemical nature and is of particular interest to physicists and physical chemists. Included are new tables on nuclear spin and moments, and data relating nuclear magnetic resonance of certain nucleides to that of the proton. New tables on superconductivity of some metals, alloys, and compounds, on dielectric constants of pure liquids, and on dielectric constants and dipole moments of substances in the gaseous state have been included in this edition. The table of isotopes has been extended and revised. A number of other tables have been revised in order to make the latest data available to the scientist.

The familiar organization of the book has been maintained, with division into sections, each section containing a general index. The index of 39 pages at the end of the handbook enables one to find information quickly. Those who have earlier editions of the handbook will find this new one a valuable addition to their library.

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Via the Rose Bread, by Henry M. Jung. Vantage Press, New York, 1958. Reviewed by W. B. BRADLEY, American Institute of Baking, Chicago. Price, $4.50.

This book represents the enthusiasm of an old man who is convinced

AACC LOCAL SECTIONS

(Continued)

and candy were flowing freely at the Centennial Mills Laboratories in Spokane, celebrating the Sept. 3 arrival, in the family of Joe Shogan, the Section's Secretary-treasurer, of a baby girl; small sister of three boys.

Martin Wise of Centennial Mills attended the Sanitation School in San Francisco.

• • •

Kansas City Section met on September 26 at the President Hotel, Kansas City, Missouri. Charles Pence of Kansas Wheat Improvement Association, Manhattan, was guest speaker. He warned that "sick" and insect-damaged wheat might be found on the market, owing to harvest and storage conditions this year. The policy of price discounts for poor varieties is causing a trend to better varieties, Mr. Pence said; however, a better yardstick than test weight is needed for elevator purchasing.

As Christmas Party Committee, Edward Chapman and Walter Cochran were appointed.

After a discussion led by the National Officers Committee, the report of nominations by this committee was deferred.

The October meeting was the Tri-Section in Manhattan on the 10th and 11th, reported last month.

that the universal use of the soaker dough breadmaking procedure (referred to as the "static-sponge-dough method") will yield huge rewards in terms of flavor, keeping quality, consumer acceptability, and, therefore, bakery sales.

Mr. Jung believes that every chemist should have a copy of this book. If you want mine, I will honor the first request I receive.

• • •

Fundamentals of Soil Science, 3rd ed, by C. E. Millar, L. M. Turk, and H. D. Foth; x + 526 pp. John Wiley & Sons, Inc., New York, 1958. Price, $7.75. Reviewed by ROBERT HOLT, University of Minnesota.

This textbook for introductory study of soils has been used extensively since its first edition in 1943.

The fundamentals of soil science are presented in a logical manner, start-with the materials from which our soils have developed and continuing through the processes of soil formation. The physical properties of soils and soil moisture are dealt with before the material on soil classification, which should give the student a better background for an understanding of classification principles.

Separate chapters are devoted to the chemical properties, soil reaction, lime and its use, organisms, and organic matter. This completes the first ten chapters and finishes what we might consider the basic principles of soil science.

The final ten chapters emphasize more of the practical and applied phase: cover and green-manure crops, farm manures, nutrient requirements of plants, fertilizer practices, conservation, fertility maintenance and productivity rating, soils and agriculture of arid regions, irrigation, and soil resources.

• • •

Advances in Agronomy, Vol. IX, edited by A. G. Norman; xi + 308 pp. Academic Press Inc., 125 East 23rd St., New York, 1957. Price, $8.00. Reviewed by ROBERT HOLT, University of Minnesota.

The objective of this book, as with others in this series, is to make available to professional agronomists surveys or reviews of the progress in agronomic research and practice. The practice of selecting problems and trends in land use and agricultural production in a geographical region has been continued, with emphasis this year on the old Cotton Belt of the United States.

This volume consists of nine chapters by authors who are well qualified in their fields.

Crop scientists will be especially interested in the chapters on lespedeza and on defoliation and desiccation as an aid to harvesting. Lespedeza is rather extensively discussed from the standpoint of its history and development, its production and utilization, and its breeding and improvement. Defoliation (accelerated leaf fall) and desiccation (chemically accelerated drying) are considered as an aid to harvesting. The advantages and disadvantages of these treatments are discussed.

Soil scientists will find special interests in the chapters on zinc deficiency, phosphorus fixation by soils, soil bulk density and penetrability measurements, residual effect of fertilizer, and the concept of Braunerde in Europe and the United States.

An excellent discussion on zinc deficiency and its control includes physiological effects, content and availability in soils, methods of determination, and the control of deficiencies.

Phosphorus fixation in acid soils is attributed to insoluble iron and aluminum phosphates whose formation is governed by solubility product, common ion and salt effect principles. Fixation in calcareous soils is due to a series of insoluble calcium phosphates. Organic phosphorus compounds are also fixed in the soil.

A review of methods for measurement of soil bulk density and penetrability includes a discussion of soil penetrometers, measurement of soil bulk density by volume and weight measurements as well as by electromagnetic radiations, and the interpretation of bulk density measurements.

The residual effect of fertilizers shows that phosphorus and potassium levels are building up in soils where crops are regularly fertilized with these elements. There is evidence that secondary nutrients may build up to toxic levels where application rates remain high. The increasing use of nitrogen fertilizers causes a reconsideration of their acidic effect.

The discussion of brown forest soils (Braunerde) in the United States and Europe is accompanied by descriptions of soil profiles from different countries along with chemical data.

Of general interest to the agronomist and soil scientist are the chapters on trends in the old Cotton Belt and the contributions of statistics to agronomy.

The variety of agronomic topics covered by this book is an assurance that almost every agro-scientist will find something of special interest.

There has been no major change from the second edition. Some expansion is noted in the material on soil classification, as well as incorporation of more recent data throughout the book. Delaying the chapter on soil classification until after a consideration of soil moisture is warranted.

Dealing as it does with the fundamental aspects as well as the application of these principles, this book should be useful as a text in a terminal soils course. On the other hand, it seems sufficiently explicit on fundamental principles to warrant use by students intending to continue their work in soils.

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The Presentation of Technical Information, by Reginald O. Kapp. The MacMillan Co., New York, and the Brett-MacMillan Co. Ltd., Galt, Ontario, 1957; 140 pp. plus index. Price, $2.95. Reviewed by T. R. AITKEN, Grain Research Laboratory, Winnipeg, Canada.

This book was first published in 1948 but not in the United States until 1957. The author is Dean of the Faculty of Engineering, University of London, and his book is based on lectures given at University College. There are 15 short chapters; three on functional English and the remainder on such topics as choice of material, making what you write understood, meaning what you say, effective use of words, circumlocutions. The book is a writing guide to help you prepare and present technical information accurately and clearly, and written in a crisp and often amusing style. It teaches with enjoyment, a combination not always found in books of this kind. It is one of the better books on the subject, and I recommend it to those who do technical writing or editing.

The book shows how the writer can convey his information from mind to mind and not merely express it, and how to make effective use of repetition, metaphor, bridges of logical reasoning, and qualifying state-

ments. Mr. Kapp stresses the importance of writing functional English, by which he means English that a writer uses who expresses his meaning clearly and without ambiguity, who spares his readers unnecessary effort, and who selects every item and places every sentence so that it will perform the function assigned to it. Although many of the examples given relate to engineering, they are applicable to cereal chemistry.

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Yeasts, ed. by W. Roman and W. Junk; The Hague; Academic Press Inc., distributors for the Western Hemisphere, New York, 1957; 246 pp. Price, $7.50. Reviewed by ROBERT F. LIGHT, Standard Brands, Inc., New York, N.Y.

This book is the first of a series to be called "Biologia et Industria" and designed to serve as a link between the biological sciences and the industries using biologically raw materials. This first monograph, "Yeasts," edited by W. Roman, with contributions by various authors, consists of six chapters covering baker's yeast, brewer's yeast, wine and fruit yeasts, Sake and similar yeasts, food and fodder yeasts, and yeast preparations. Each chapter deals with the biology, biochemistry, and technology of the field covered.

The organization of this book leaves much to be desired and the contributions by the various authors were poorly coordinated, resulting in a duplication in coverage. The proofreading for this book was inexcusably lax. There are a number of misspelled words, errors in subscripts to the references, and in one instance two lines from the top of one page (108) were transposed to the next page (109). It is regrettable that the contributions of the several competent authors have been so poorly edited and published.

The chapter on "Brewer's Yeast" by Thorne more nearly accomplishes the avowed purpose of this monograph than any other chapter in this book — that is, to serve as a link between science and industry. Thorne treats the biology of brewer's yeast very adequately and the biochemistry and technology of brewer's yeast are given excellent coverage. Thorne's chapter is thoroughly documented with 596 references.

In the chapter devoted to "Baker's Yeast" Pyke gives a scanty account of yeast production, while Nickerson's treatment of the "Cytology and Cytochemistry" of yeast is detailed and fundamental. Nickerson and Schultz give a very useful account of the physiology of yeasts which is well documented.

Thaysen's historical account of the development of food and fodder yeasts is interesting and informative and he presents a good discussion of equipment and production problems. The contribution on "Sake and Similar Yeasts" by Arima is an excellent account of the fermentation art as practiced in the Far East. His report on the production of Sake is informative and authoritative. The chapter on "Wine and Fruit Yeasts" by Schanderl is of limited value. There are only twelve references cited and only two since 1942. Pyke's contribution on "Yeast Preparations" is supported by 131 references and, while brief, gives a good survey of the many present and potential uses of yeasts.

The concept of a series of monographs designed to bring research and industry in the biological field in closer communion is excellent, and the reviewer hopes that future monographs of this series will be more effective in achieving this purpose. Because of the many errors in this book it is not recommended as a reference book. The section on "Baker's and Brewer's Yeasts" will be of interest to cereal and brewing chemists.

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Federal Food, Drug, and Cosmetic Act, as Amended. An act to prohibit the movement in interstate commerce of adulterated and misbranded food, drugs, devices, and cosmetics. Issued in loose-leaf form (42 pp.); revised 1958. Price, 35 cents. Available from Government Printing Office, Division of Public Documents, Washington 25, D.C. (Item 26U, Catalog No. FS 13.-105:F 73/958)

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General Regulations for the Enforcement of the Federal Food, Drug, and Cosmetic Act, Title 21, Part 1. Contains general regulations for the enforcement of the Federal Food, Drug, and Cosmetic Act, as Amended. Issued in lose-leaf form (28 pp.); revised 1958. Price, 25 cents. Government Printing Office, Washington D.C. (Item 27U, Catalog No. FS 13.106:F 73/958)

TENTATIVE PROGRAM FOR 1959 ANNUAL MEETING

Topics and Session Chairmen

Baking and Bakery Products — D. K. DUBOIS, Huron Milling Division, Hercules Powder Co., Harbor Beach, Mich.

Practical Aspects of Cereal Testing — JAMES M. DOTY, Doty Laboratories, 1435 Clay St., North Kansas City 16, Mo.

Grain Structure and Grain Constituents — MAJEL M. MACMASTERS, Cereal Crops Laboratory, Northern Utilization Research and Development Division, Peoria, Ill.

The Wet-Milling Industry — JOHN T. GOODWIN, JR., Corn Industries Research Foundation, 1001 Connecticut Ave., Washington 6, D. C.

Grain and Milling Technology — H. H. SCHOPMEYER, International Milling Co., Minneapolis 2, Minn.

Grain Sanitation — W. H. SCHOENHERR, Lauhoff Grain Co., Danville, Ill.

Grain Drying — J. A. SHELLENBERGER, Dept. of Flour and Feed Milling Industries, Kansas State College, Manhattan, Kansas.

Cereals in Feeds — H. E. BECHTEL, Feed Division Research Farm, General Mills, Inc., Indianola, Iowa.

Cereals in Foods — R. A. LARSEN, Research and Development Dept., The Pillsbury Co., Minneapolis 14, Minn.

Chemicals from Cereals by Microorganisms — JOHN R. MATCHETT, U.S. Dept. Agr., Agriculture Research Service, Washington 25, D. C.

The Food and Drug Administration and the Cereal Chemist — V. E. MUNSEY, Division of Food, Food and Drug Administration, Washington 25, D.C.

Current Trends in Fundamental Research as Related to the Cereal Chemist — ROBERT B. KOCH, Quartermaster Research and Engineering Command, 1819 West Pershing Road, Chicago 9, Ill.

Technical Committee Reports — JOHN A. JOHNSON, Dept. of Flour and Feed Milling Industries, Kansas State College, Manhattan, Kansas

Observations

We need your help! Program chairman, Frank Horan, has invited us to head a session for the A. A. C. C. convention in Washington on "Practical Aspects of Grain and/or Cereal Testing." We accepted this assignment with the stipulation that all papers on this session would be of a practical nature, either practical or applied research and review type papers excluding all pure research material.

So far we have obtained the following papers: "A Method for Determining Wheat Gluten Vitality;" "A Review of All Methods for Determining Wheat Gluten Quality;" "A Review of Recent Modifications in Methods to Determine Insect Contamination in Cereal Grains;" "A Review of Grain Fumigants: Specific Application, Time, Temperature and Humidity Effect, Toxicity, Residues;" and "A Review of Test Baking and Labor Saving Techniques."

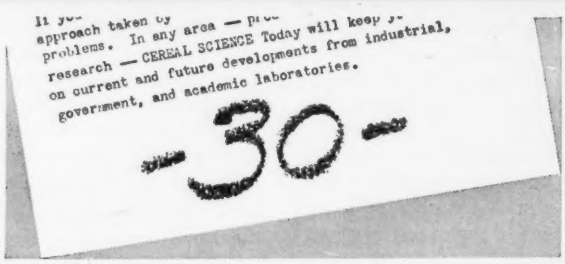
We need a "Method for Determining Percentage of Fractured Starch Cells in Wheat Flour." Furthermore, we need your suggestions for subjects that you would like to have presented or reviewed during this practical session. We would appreciate very much any ideas that you have about labor-saving gadgets or desired procedures to solve specific problems. Furthermore if you have material that would be of interest in a practical way to chemists in other laboratories, we would like to have you submit a title and an outline of the material you have.

It is our sincere hope that this session can be made of genuine practical value to all laboratory technicians. Please let us hear from you.

Jim Doty

DOTY
Laboratories

1435 Clay St.,
North Kansas City 16, Mo.
MILLING FEED ANALYSIS
VITAMIN ASSAYS
BAKING SANITATION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government, and academic laboratories.
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AACC MEMBERSHIP DIRECTORY

The 1958 Membership Directory has been completed and turned over to the printer. As usual it will include all 1958 members and their mailing addresses. Next year a new type of directory will be issued as a result of many requests from the membership. This new directory will give both business and home address plus a geographical and company breakdown. To obtain the necessary information we have mailed to each member a directory card to be returned when the 1959 dues are paid. Thus far the returns have been good although a few members have forgotten to complete and return the card. We would like to remind all of our members that unless a card is returned we will not be able to list them properly.

ARE DUES FOR SCIENTIFIC SOCIETIES REASONABLE?

Yes, yes, yes — by any yardstick. Take union dues for example. Do you know what the dues are for skilled craftsmen such as in the graphic arts industry? The Mail Advertising Service Association recently printed an item on union dues in its official bulletin. It pointed out that compositors pay up to $300 annually; pressmen $75; lithographers $150, and mailing workers $240. Taxi drivers often pay $48 a year; truck drivers more than $60; construction workers $120, and airplane pilots up to $500 each. In the professional field, nurses pay $35 to $40 per year for just one organization.

The average chemical worker is a member of two or three organizations and usually spends $40 to $50 per year for dues. In most cases the dues include journals whose subscription price exceeds the cost of membership. The AACC membership includes a subscription to both of its publications. These subscriptions cost nonmembers $18. Thus if the members received nothing else but the two journals they would be getting a $3.00 discount. But members do receive other goods and services. For example there's the Annual Meeting with its many opportunities for personal contact with fellow workers (and potential customers); there's the meeting program with abstracts of all the technical papers; members can use the National Check Sample Service to check out their laboratories; and specialized books such as *Cereal Laboratory Methods* and the *Monograph Series* are made available at discounted rates.

The chemist who does not belong to one or more of his professional societies not only cheats himself of a rewarding and almost necessary experience, but he also cheats the profession that supports his physical and intellectual existence.

Membership in any scientific organization is an investment in one's professional future. For less than 29¢ a week a chemist can maintain a membership in the AACC. This is hardly more than the price of a package of cigarettes or a loaf of bread. It would seem to be a small price to pay for the value received.

DO YOU REMEMBER?

Excerpts from "The News Letter," October 20, 1933.

. . . The Lone Star Section was organized May 20, 1933, at a meeting at the Texas Hotel, Ft. Worth. Eleven chemists signed up at the meeting and voted to name the organization the Lone Star Section. Later three others joined, bringing the number of charter members to 14. The following officers were elected: P. W. Preston, *Chairman;* G. E. Findley, *Vice-Chairman;* Rolfe L. Frye, *Secretary-Treasurer.*

. . . Rowland J. Clark now heads the new cake laboratory of the American Dry Milk Institute in Kansas City, Missouri, where extensive research will be made on the use of fat-free milk solids in bakers' cakes.